FLIGHT
and
AIRCRAFT ENGINEER

Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor - - C. M. POULSEN
Assistant Editor - MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor - - JOHN YOXALL

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams : Flightpres, Sedist, London. Telephone : Waterloo 3333 (50 lines.)

COVENTRY: 8 - 10, CORPORATION ST. Telegrams : Autocar, Coventry. Telephone : Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams : Autopress, Birmingham. Telephone : Midland 7191 (7 lines).
MANCHESTER, 3: 260, DEANSGATE. Telegrams : Iliffe, Manchester. Telephone : Blackfriars 4412.
GLASGOW, C.2: 26B, RENFIELD ST. Telegrams : Iliffe, Glasgow. Telephone : Central 4857

SUBSCRIPTION RATES : Home and Abroad : Year, £3 1 0. 6 months, £1 10 6.

Registered at the G.P.O. as a Newspaper

No. 1996. Vol. LI. March 27th, 1947 Thursdays, One Shilling.

The Outlook

Two Sorts of Progress

TWO events took place last week which served to focus attention on the way flying is shaping. One was the presentation to G/C. Donaldson of the Britannia Trophy for 1946, and the other the first annual dinner of the Helicopter Association of Great Britain. The Britannia Trophy is awarded for the most meritorious performance in the air each year, and obviously the 1946 award was thoroughly well deserved. To paraphrase the famous *Punch* saying, "if you like speed, this 616 m.p.h. is the sort of thing you like."

A. V-M. Sir Charles Longcroft, the first holder of the Britannia Trophy, admitted that he had not piloted an aircraft for five years. He thought he could do it, but the vast array of instruments frightened him.

Capt. Pritchard put it differently at the helicopter dinner. He considered it crazy, in commercial aviation, to have aircraft landing at 120 m.p.h. and expect to "get away with it" every time, especially as the number of suitable airports was so limited. His view, and it is also ours, expressed on more than one occasion, is that aviation has run away from itself; that before we talk of cruising at 400 or 500 m.p.h. we should learn how to keep an aircraft in the air at 60 m.p.h. or so, under full control. When we have learnt how to do that it is time enough to see what is the highest cruising speed we can couple with the low landing speed. In the meantime, and unless and until high-lift devices far more effective than any now available have been discovered, we should pause in the mad race for high cruising speeds and be content with reasonable wing loadings and their associated lower landing speeds. The operators are to blame, not the designers and constructors, who produce what is demanded.

The helicopter covers the low-speed end of the scale, but it is complementary to, not a competitor of, fixed-wing aircraft.

Airscrew-Turbine Development

TWO significant announcements have recently been made in the aircraft gas turbine field, namely—that Bristol Theseus power units have made a successful start on their air test schedule, and that this type of airscrew-turbine is to be put into production at the request of the Ministry of Supply.

Power units comprising an airscrew driven by a gas turbine have flown before in this country and in America, but they have all been of a strictly experimental nature. The Theseus has reached a more advanced stage than any other unit in its class, and it stands alone in holding a full type-test certificate. That it is considered highly promising is indicated by the decision to go into production, and it is certain that a number of installations are in mind, in addition to the Hermes V. Details of the Theseus installation in a Lincoln modified for duty as a flying test-bed, and some preliminary data concerning the Hermes V will be found in this issue.

With heat exchanger the specific fuel consumption of the Theseus at current transport speeds and altitudes is low enough for it to be fairly claimed that a gas turbine for the first time approaches the economy of a comparable piston engine. One more indication that this country is holding, if not improving, its lead in aircraft gas turbine development, and the knowledge that the months of research and development which have gone into the airscrew-turbine in particular are now being rewarded with some success, is very welcome.

Air Transport Economics

SAFETY in air travel, or the absence thereof, is a subject which all have been discussing freely of late. The economics of so-called commercial flying are shrouded in mystery so far as this country is concerned. In the United States there are available voluminous statistics which enable one to form a picture

of the financial position of the different companies.

It will be some time before the trading accounts of our own British Overseas Airways Corporation for the financial year that is just ending are placed before Parliament, but in the meantime one may assume that the lecture delivered to the Birmingham branch of the Institute of Transport recently by Mr. F. N. Hillier, B.O.A.C.'s publicity controller, was "inspired." He did not claim to be speaking in his official capacity, to be sure, but he would scarcely have been allowed to make the statements which he did make without having them approved.

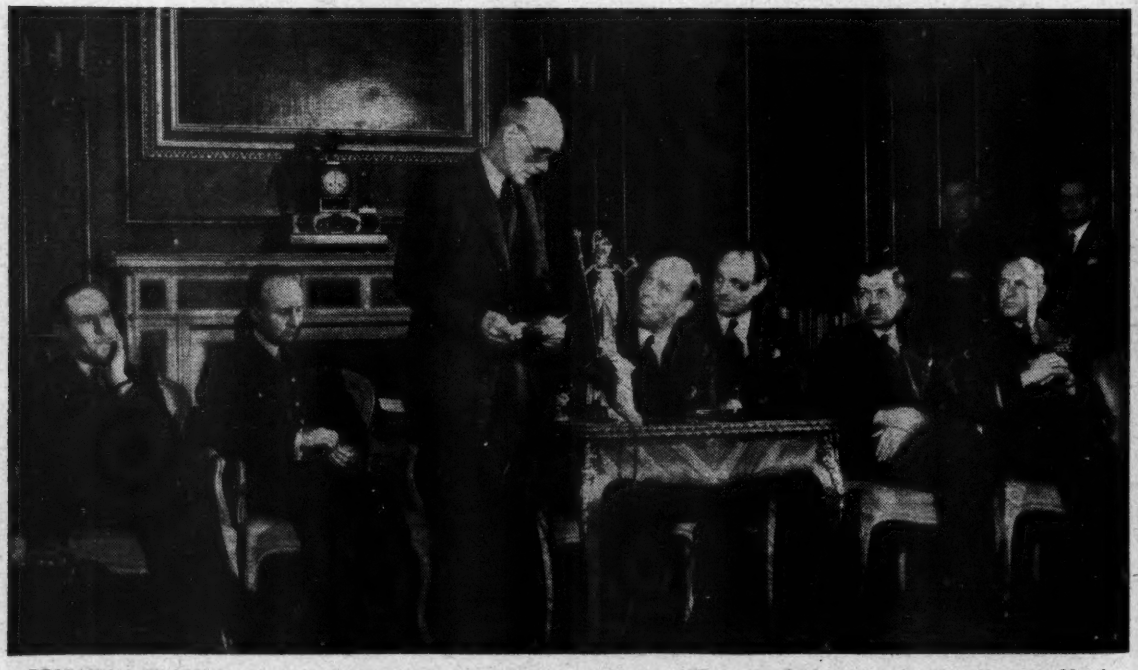
All in all Mr. Hillier's address can be said to have prepared the ground for a financial shock when B.O.A.C.'s accounts are rendered to the nation. This preparation took the form of an outline of all the handicaps under which the corporation is working at present: Aircraft in use are of interim and makeshift types, uneconomic to operate; maintenance has to be done at bases away from the main airports, thus causing loss of time and increased expense; a multiplicity of aircraft types and an even greater number of engine types, again adding to the expense of training personnel and the cost of spares; relatively low utilization figures, caused by conditions on the air routes operated, and by other factors outside the corporation's control; and the question of communications, which at present are not all that they might be.

Truly Mr. Hillier presented a formidable list, and there is no gainsaying the fact that all these handicaps do exist, nor that they are of very real practical importance. No doubt when the accounts are ultimately published, they will give chapter and verse for the actual amounts in money which all these difficulties represent. Mr. Hillier confined himself to outlining their nature. When he did go into actual figures it was in the form of percentages. For example, he took an aircraft which was "ideal" for the Australian and South African routes and compared it with such types in present use as the Avro Lancastrian and Short Hythe class flying-boat. On that somewhat doubtful basis (in view of the fact that the "ideal" aircraft for any route never has existed and never will) he calculated that the Lancastrian operating cost per capacity ton-mile is 60 per cent greater, and that of the Hythe 2½ times greater. These figures related to what is termed the "limiting sector," i.e., the longest stage, and Mr. Hillier admitted that the cost figures for the whole journey are better, but they were still 12 and 70 per cent higher than they would be with a suitable aircraft.

Flight, as a staunch advocate of the flying-boat, is glad to have Mr. Hillier's concurrence that "there is a sufficiently strong possibility that the flying-boat may prove a successful competitor of the landplane in certain instances to make it desirable that the development of the flying-boat should continue, and it must not be forgotten that flying-boats are extremely popular with the public." How true, Mr. Hillier, and do not forget that the customer is always right!

CONTENTS

Outlook	255
Flight Equipment for High Latitudes	257
Here and There	260
The Brabazon !	262
Fashions in Folds	a
Air Estimates Debated	267
Mission to India—IV	268
Theseus Air Testing	270
Civil Aviation News	274
Correspondence	277
Service Aviation	278



BRITANNIA TROPHY, 1913 and 1946 : The Trophy was presented by Lord Brabazon of Tara at Londonderry House on March 19th to G/C. Donaldson. From left to right in the group are Air Chief Marshal Sir Philip Joubert, G/C. Donaldson, A.V-M. Sir Charles Longcroft, who was the first winner of the Trophy in 1913, Lord Brabazon, Mr. Whitney Straight, Col. Preston and A.V-M. Vincent, S.A.S.O. Fighter Command.

Flight Equipment for High Latitudes

Crew Protection More Important than Elaborate Heating Arrangements for Engines

By John Grierson

In 57 deg. S., 50 deg. E. Picture of the pack ice north of Enderby Land, as seen from one of the Walrus amphibians of the *Balaena*. The picture was sent by Mr. Grierson from the Antarctic.

"BALAENA," the whaling ship which includes three Walrus amphibians in her equipment, has been in the Antarctic for several months and will remain there for several more weeks. John Grierson is in charge of flying, and in this article, written on board, he explains the use of the special equipment which is essential to comfort and safety when operating aircraft in Arctic and Antarctic climates.

The expedition has been hampered by the refusal of the U.S. Navy Department to let "Balaena" and her aircraft use the U.S. Naval YE Homing Radio Beacon. To this handicap must be added the fact that the Norwegian whale factories have failed to keep their part of the agreement, made at the outset, to send out daily weather reports. Thus weather forecasting has been rendered somewhat uncertain by the lack of outside weather information. In spite of this, however, Grierson expects "Balaena" to bring back plenty of oil, as will be seen from the reproduction of his ship letter telegram on the next page.

THE problems of flying in the Arctic or Antarctic are very similar. In both places the air temperature at sea-level is not particularly low in summer-time (Christmas falls during mid-summer in the Antarctic), but the sea itself is always cold. There is a far greater area of land in the Arctic, much of which lies bare in summer, but in the Antarctic, the covering of snow and ice is permanent throughout the year. These geographical facts affect flying in two ways. First, because sea-level temperatures run just above or just below freezing until late in the summer season, when they do not fall much below −20 deg C, so there is no need to take very elaborate precautions in regard to engine heating or the lubrication of control mechanisms. Secondly, because of the coldness of the sea, everything possible must be done to protect the aircrew against the consequences of exposure in case a forced-landing should be necessary.

If operational conditions allow of aircraft being regularly stored in a heated hangar, the need of oil dilution at base will disappear, but "Worthing" will nevertheless be essention for starting-up the engine of a machine which has had to lie on the surface of the sea or ice for any appreciable time. Means of heating the interior of the aircraft independently of the engine exhaust system is to be preferred to the rather cumbersome business of wearing electrically heated suits. In my experience the electrical suits give plenty of warmth and are suitable for the pilot, but for crew members (such as navigator and wireless operator) who have to move about, the bulk of the suits is a drawback in a small machine; also the need for frequent plugging-in and plugging-out of the connections. The Janitrol petrol combustion heater promises to fill the breach, and preliminary indications are that 15,000 B.Th.U. in heated air are sufficient to make life comfortable in the hull of a Walrus. The electrical running load is less than that of one electrically heated suit, and the consumption of petrol is only about one-seventh of a gallon per hour.

The Immersion Suits

The protection of men who had to land in the sea during Arctic convoy patrols was one of the lesser-known triumphs of the war. For it is well known that if a man falls uninjured into water near freezing temperature, and is allowed to get wet, he will die within a matter of minutes due to shock. Work was, therefore, initiated by S/L. Pask, M.D., of the Institute of Aviation Medicine, R.A.E., in order to develop a suit which was waterproof but would, at the same time, allow air to penetrate when worn out of the water, and so prevent sweating. A cotton fabric material, which was porous when dry but became instantly watertight through shrinkage on immersion in water, was produced by Messrs. Frankenstein, of Manchester, who were responsible for manufacture of the entire suit.

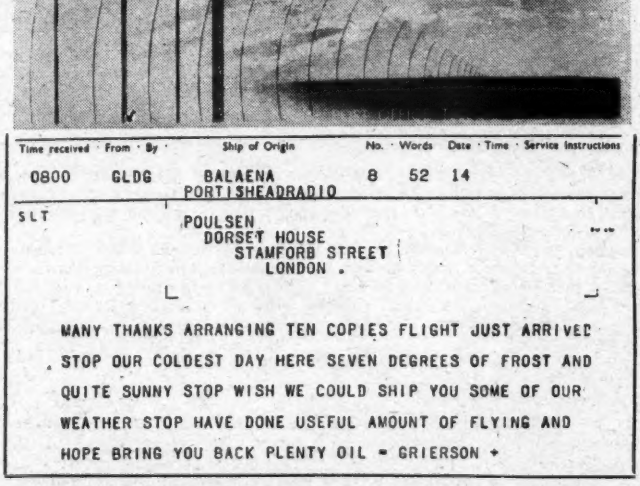
Essential features were: a wide rubber panel at the neck, rendered watertight by a Nylon lace; a tight-fitting flying helmet sewn on to the collar of the suit; diver's-type rubber wristlets to prevent the ingress of water at the wrists; and felt-padded rubber boots hermetically sealed on to the hems

FLIGHT EQUIPMENT FOR HIGH LATITUDES

of the trouser-legs. Other refinements included a watertight screw-plug for urination; a pair of dinghy gloves in sealed rubber envelopes, carried in the knee pockets; and an emergency rip-panel on each leg so that, should the suit become waterlogged for any reason, the water could be let out. As indicating the co-operation of both the interested Services, as well as of the manufacturers, much of the detail development was carried out by Surgeon-Lieut. Gabb, of the Naval School of Aviation at Eastleigh.

Although the suit had already proved its worth by saving many lives in the Arctic seas before the war had ended, it was still being improved up to that time. In fact, it cannot yet be said to have reached finality, but the latest form is an entirely practical garment. I made my first sea-water test with the suit in February, 1946. I clothed myself in aircrew underwear, made of wool and Nylon, then donned submarine smock, panties and stockings with the suit—officially classified as Naval Immersion Suit No. 1, overall. On top of that I had a Mae West with a life-line attached and, under the supervision of Surgeon-Lieut. Gabb, I lowered myself from the stern of a launch into the frigid water of the Solent. After swimming around on my back for 20 minutes, I climbed back into the launch. The only discomfort was caused by a slight leak at a patch on the suit, which was actually an old one. This experience convinced me that the inconvenience of having to don a one-piece suit was adequately outweighed by the protection given. The subsequent effect on morale of anyone having to fly over Arctic or Antarctic waters is obvious.

So the Naval Immersion Suit No. 1 became our first line of defence in the Antarctic, and for flying down here it has proved one of our most valuable assets. No difficulty or discomfort has arisen with the suits on flights up to 5½ hours in length. As a result of our experience, I should say that no sane person should attempt to fly over Arctic or Antarctic seas without one of these suits.


SHIP LETTER TELEGRAM
Time received · From · By · Ship of Origin No. · Words Date · Time · Service Instructions
0800 GLDG BALAENA 8 52 14
PORTISHEADRADIO
SLT
POULSEN
DORSET HOUSE
STAMFORD STREET
LONDON .
MANY THANKS ARRANGING TEN COPIES FLIGHT JUST ARRIVED
STOP OUR COLDEST DAY HERE SEVEN DEGREES OF FROST AND
QUITE SUNNY STOP WISH WE COULD SHIP YOU SOME OF OUR
WEATHER STOP HAVE DONE USEFUL AMOUNT OF FLYING AND
HOPE BRING YOU BACK PLENTY OIL = GRIERSON +

Flight farthest South. The message reproduced here was received in response to an S.O.S. for copies of our journal. They had to catch a tanker leaving Capetown for the Antarctic on a certain date, and there was no time to send them from London, but our Capetown agents managed to scrape together ten copies for dispatch to the *Balaena*.

Forced-landing Precautions

Owing to the uninhabited nature of the Antarctic, and the dearth of shipping, forced landings must be provided against on the most elaborate scale permissible within the carrying capacity of the aircraft. The two obvious types of emergency are: landing in such conditions that the crew are able to camp out on land, an iceberg or an ice floe, or else a landing in the sea where conditions necessitate living afloat, either in the aircraft or in the dinghy. Equipment for the first must include a grapnel or ice-anchor so that, if the machine is afloat, it may be secured; and also a tent, Primus, sleeping-bags and rations on as large a scale as possible. For the second, a dinghy with the best possible insulation against the elements, as well as containing the ordinary dinghy emergency supplies and equipment, is the primary need. In both cases an item of supreme importance is the emergency wireless transmitter, with a built-in hand-driven generator.

Tents are things on which all the Arctic and Antarctic experts hold different opinions, so I decided to seek the help of one expert only. My advice came from Mr. Wilfred Hampton (now of B.O.A.C.) who had gained his Polar Medal with bar through his flying and other exploratory work in East Greenland under Gino Watkins, and also through flying in the Antarctic on the British Graham Land Expedition (1934-36). Consequently a special pyramid tent was made for us by Benjamin Edgington. The tent was a double one, the floor dimensions being 6ft by 7ft and large enough for three men in sleeping bags. It had no eaves, full sides and a bottom flap lying outwards, a separate groundsheet, and a ventilator hole in the top. The pyramid was formed by four telescopic sets of duralumin tubes and the complete tent in its carrying case weighed only 17½ lb.

No Fuel Crisis in Antarctic

The Primus stove is too well known to call for much comment beyond the question of fuel. If the leaded fuel normally used by aircraft has to be burnt, much trouble may arise through choking of the jet. In our case, however, this difficulty does not arise because we are using a special grade of 91 octane clear-run unleaded fuel. This costs about 4d per gallon more than the conventional 87 octane, but the advantages in handling and engine maintenance under the rugged conditions of the Antarctic make the extra cost well worth while.

Both the Scott Polar Research Institute and the Insitute of Aviation Medicine at Farnborough have a high opinion of American and Canadian sleeping-bags. However, we encountered great difficulty in obtaining supplies of either, so we obtained a sleeping-bag of standard R.A.F. pattern to see if this could be made to meet our requirements. The bag consists of an outer canvas envelope, a quilted intermediate envelope stuffed with real down, and an inner sheet envelope. The three advantages are simplicity, no zip fasteners (which may give trouble in snow and ice), and the fact that the down provides good upper insulation. The only drawback is that extra ground insulation, which might be obtained from a reindeer or caribou skin, must be provided if the bag is going to lie on ice.

Even better ground insulation should be given by a layer of air, and we were lucky in obtaining the assistance of the Balloon Development Unit at Cardington to design and manufacture for us a supply of pneumatic rubber mattresses at short notice. The mattresses could be inflated by the dinghy bellows, and they were attached to the sleeping-bag by the simple expedient of sewing an auxiliary canvas envelope on to the lower surface. In this way we got a bag which had good insulation properties and which was very comfortable to sleep

FLIGHT EQUIPMENT FOR HIGH LATITUDES

in. The complete weight was 12¼ lb.

Arctic and Antarctic rations have to meet the conditions of cold by having a high calorific and fatty content. Dehydrated food, provided it is palatable, is particularly suitable because a supply of water from ice or snow can be expected. The finest dehydrated Arctic rations so far produced were those made for the *Aries* by the Low-Temperature Research Station at Cambridge. They contained porridge, cheese (with added fat), biscuits (with high fat content), butter, milk (full cream), meat and vegetable stew, fruit, beef and tomato, potato, scrambled egg, cod, mutton and onion, herring, curry, semolina, tea, coffee, cocoa, chocolate and sweets. Such a variety enables three meals daily, giving 3,500 calories, to be planned with four changes of menu.

Unfortunately, it was impossible to have new rations manufactured to these formulæ, but we were able to purchase some of the original rations to be flown over the Pole. They were packed in four-gallon petrol tins, and as these were too cumbersome for our Walri, we had special tins of about one-gallon capacity designed and manufactured in the Isle of Wight. Five such tins, weighing a total of 63 lb, contained sufficient food for a crew of 3 to exist 10 days.

"Flight" photograph.

John Grierson (nearest the camera) in the cockpit of his Antarctic Walrus amphibian.

Modified Dinghies

In the normal inflatable open dinghy, men are lucky if they survive more than 48 hours in the open sea. In the light of some exposure experiments carried out by the Americans in the Aleutians with a tented dinghy, when the occupants survived 9 days of atrocious weather, we decided to modify our existing M-type dinghies on the advice of the Naval School of Aviation Medicine. The work was carried out by the Balloon Development Unit, and consisted of fitting a double, inflatable, bottom and a series of triangular flaps fixed around the periphery. The apexes of these triangles buttoned on to a collapsible duralumin mast in the centre, and on its top was mounted a ventilator cone. Practical tests at Saunders-Roe indicated the difficulty of climbing into the dinghy from the sea, so we added a rope ladder to its equipment. The complete dinghy weighed 55 lb.

For use in the dinghy, two emergency packs of standard Service pattern, were carried. They contained 3 tins of water, 2 desalting kits, 3 tins of self-heating soup (Mock Turtle and Mulligatawny), 2 fishing kits, 3 flying emergency ration IIIs, 3 special ration "Bs," 2 waterproof tins of matches, 1 first-aid kit, 5 special Wessex smoke signals, 4 two-star Service red self-igniting signals, and 1 heliograph mirror.

The emergency wireless set, which has been adequately proved during the war, is the "Gibson Girl." This outfit is carried in a yellow waterproof case and will float in water. The equipment comprises a hand-operated generator which will transmit an automatic distress signal on 600 metres, or can be worked by hand key. There is also a light attachment for visual signalling. The aerial is flown either by means of a collapsible kite (which is rather cumbersome to erect inside a Walrus when there is any sea running), for flying in winds of over 10 m.p.h., or by means of a balloon in calm. There are two balloons in the kit and two hydrogen generators, each capable of filling a balloon when immersed in sea water for 20 minutes. The weight of the complete set is 36 lb.

Over and above the equipment carried in the aircraft for its own immediate safety, it is also desirable to provide for the contingency of being able to bring help from the air to a stranded crew. To this end, we had a special supply dropping parachute pack manufactured by the G.Q. Company. Advice concerning design detail was given by the M.A.P. and by the Parachute Development Unit, who assisted us with the trial drops at Beaulieu. We found it possible to release the fully loaded pack, containing 50 lb of ballast, from as low a height as 200 ft owing to the speed of opening. None of the expected difficulties in pushing the pack out of the navigator's starboard window materialized. This emergency parachute pack is, of course, not normally carried in the aircraft and is only for use aboard a relief plane.

Although the above list may sound rather a formidable array of equipment to carry in a small aircraft, there is no reason to suppose that any of it is of a faddy or unnecessary nature. In fact, my opinion is that this is an absolute minimum for flying in the Antarctic, and nothing we have seen down here so far points to the contrary.

THE BRITANNIA TROPHY

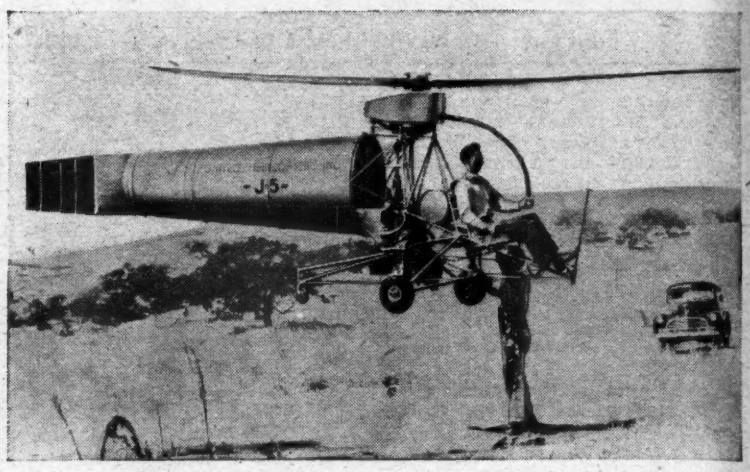
LORD BRABAZON OF TARA, on March 19th, presented to G/C. E. M. Donaldson, D.S.O., A.F.C., the Britannia Trophy for 1946 in recognition of his flight in a Meteor establishing a new world's record of 616 m.p.h. The Britannia Trophy was presented to the Royal Aero Club in 1913 by Horatio Barber, one of Britain's pioneers in aviation, for the most meritorious performance in the air.

Many previous holders were present, and Lord Brabazon recalled some of the milestones that had been established meanwhile. Mr. Barber had sent a cablegram from Bermuda congratulating G/C. Donaldson on his great achievement. The gathering sent a reply to Mr. Barber, the text of which was as follows: "Best wishes, thanks and appreciation from present and five past holders of Britannia Trophy. Signed, Longcroft, Seddon, Bentley, Uwins, Mollison and Donaldson."

Air Vice-Marshal Sir Charles Longcroft, the first holder, 1913, for a non-stop flight in a B.E.2 from Montrose to Portsmouth and on to Farnborough, referred to the time it took him to cover the 500-odd miles and the time it would take Donaldson in a Meteor. That showed the progress made. He had not piloted an aircraft for five years; he thought he could but for the fact that all the gadgets in the cockpit frightened him. There were too many "taps."

G/C. Donaldson preferred to accept the trophy on behalf of all the people who had done the spade work, Glosters, Rolls-Royce and others. The machine would have done more than 616 m.p.h. if conditions had been favourable.

HERE AND THERE



JET STEERED. Stanley Hillier flies his latest helicopter, which has a tail jet similar to that used in this country in the Weir W.9, which was demonstrated at the S.B.A.C. show at Radlett last year. The torque compensation is of opposite hand to that of the W.9.

The Goblin-Bluebird

THE installation of a de Havilland Goblin turbine jet unit in Sir Malcolm Campbell's *Bluebird* will save 430 lb in weight as compared with the original craft and offer an enormous reserve of power, should *Bluebird* prove capable of utilizing it. The Goblin, of course, is comparatively inefficient at speeds of the order of 140 m.p.h., but it is stated that the net propulsive efficiency of the original piston engine-screw combination was only 45 per cent.

Picking Up the Threads

DEVASTATED by war the Polish aircraft industry is slowly being re-established and the Aircraft Design Centre in Warsaw has resumed work. Apart from the two-seat CS10 and CS11 a twelve-passenger all-metal transport, known as the CS12, has been designed.

Sweet Swan of Avon

"AVON" is the seemly name likely to be conferred on the A.W.55 (Brabazon IIB) transport monoplane. This promising 36,500-lb transport will be powered by four A.S. Mamba airscrew-turbine units.

Inner Cleanliness

SYNTHETIC detergents derived from petroleum, announced by Shell last week, are particularly suitable for cleaning the interior fittings of aircraft. They do not attack aluminium or its alloys.

Air Survey

ORDERS for Williamson cameras and equipment have been received from the Geodetic Institute of Denmark for an important air survey of Greenland, scheduled to begin shortly. This is largely the outcome of a recent flying visit to Denmark by Mr. J. E. Odle, assistant managing director of the Williamson Manufacturing Co., Ltd.

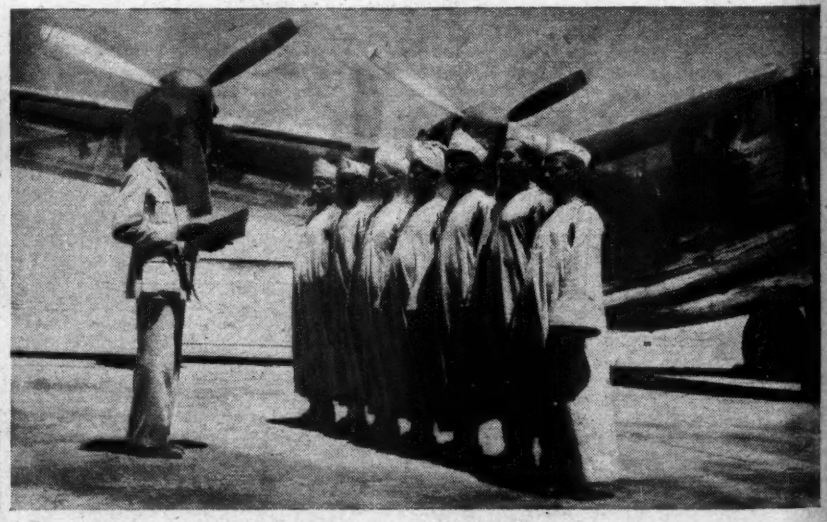
Back Area Postal Service

CONNELLAN AIRWAYS, which operates from Alice Springs in Central Australia, is owned, managed and controlled entirely by Mr. E. J. Connellan. He is also his own chief pilot. A subsidy of £10,000 is paid annually to the company, which provides mail services to about sixty small townships within the Northern Territory. No air-mail surcharge is levied on either letters or parcels sent to these districts, and mail runs are made fortnightly over the whole route, which totals 5,611 miles.

In November we published brief specifications of the type of aircraft suitable for the sort of work done by this company. There would seem to be a certain demand, especially in Australia, for a type which is robust and efficient, capable of carrying four or five passengers and a load of about 1,650 lb, while being at the same time comparatively simple to manufacture.

The Quest for Speed

UNDER the title "The Endless Quest for Speed" Iliffe and Sons have just published *The Autocar* Portfolio of Motor Racing, containing 12 full colour plates from drawings by the late F. Gordon Crosby which give pictorially the spectacular history of the motor car from the early days to achieve 60 m.p.h. with the utmost difficulty, through those great races which have served to develop the motor car until it has become what we know to-day. There is a world of adventure and romance behind this series of pictures, as well as a whole history of racing development and by inference.



HERE AND THERE. B.O.A.C.'s security branch now has a strength of 600, widely distributed over the routes. On the left is seen a security warden at London Airport, and on the right Sudanese wardens on parade at Almaza.

HERE AND THERE

the achievement of man as driver. A second series of colour plates is being compiled to be published in the near future.

Copies of this portfolio can be obtained from Dorset House, Stamford Street, London, S.E.1, price 5s net (postage 3d extra).

Flying Meeting Cancelled

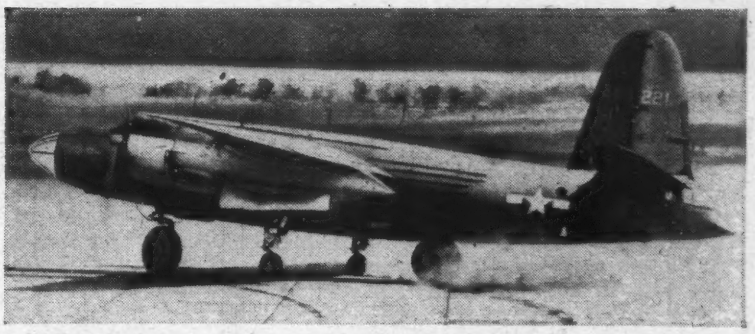
THE recent bad weather has been responsible for holding up the programme of the Wiltshire School of Flying and it has been decided to cancel the flying meeting which the Wiltshire Flying Club was to have held on April 5th. The Royal Artillery Aero Club is holding a rally on June 14th and 15th at High Post, to which visitors will be very welcome.

Miss Blandish Was Lucky

WHEN sea communications between the Scilly Isles and the mainland were interrupted by the recent severe weather, an aircraft of Island Air Services was chartered to fly flowers to the mainland for transportation to the wholesale markets, thus saving the growers considerable losses. Mr. Hills-Grove-Hills, the pilot and owner of Island Air Services, made seven trips a day to Penzance for three weeks.

Real Export

A YEAR ago the Swedish Government signed contracts with de Havillands for a large number of Vampires, for a further supply of Goblins, and for the licence to manufacture Goblins in Sweden. Being entirely satisfied with the aircraft and engines, the Swedish Government now plans to manufacture the Vampire. Not only so, but it has purchased a large number of Ghost engines and is negotiating for the manufacture of the Ghost as well as the Goblin. The new contracts bring the total value up to several million sterling and thus represent a very large contribution to British exports.



TANDEM TEST: A Martin Marauder with an experimental undercarriage of a type proposed for high-speed aircraft with thin wings. The two main wheels are in tandem, with two small steadying wheels outboard. Note how the fuselage has been stiffened to take the rear wheel loads.

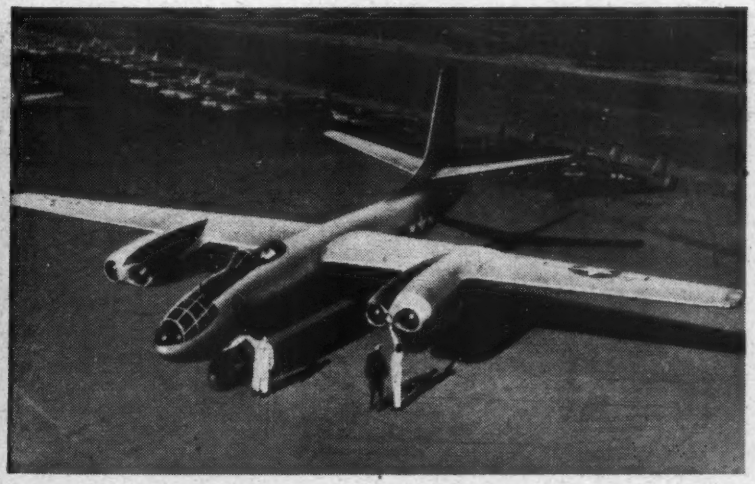
Mach and Learn

A RECENT Notice to Airmen warns pilots that pilotless model aircraft will be operated within an area of 11.5 miles radius, centred on Lat. 49 deg. 53 min. N., Long. 06 deg. 50 min. W., 14 miles W. of Bishop Rock, Scilly Isles, during the period of six months from April 1st, 1947. These aircraft may be seen diving from about 40,000ft. Tests will take place only in daylight and no more than three aircraft per week should operate.

They are, of course, the Vickers transonic models described in *Flight* of July 11th, 1946.

Another "First"

THE Royal Aero Club has just issued No. 1 F.A.I. Helicopter Aviator's Certificate to W/C. R. A. C. Brie who thus shares with a small number of other pioneers the distinction of a No. 1 certificate. The first Aeronaut's Certificate (balloons) was issued to C. F. Pollock in 1905. Then followed the heavier-than-air No. 1 to Col. J. T. C. Brabazon (now Lord Brabazon of Tara) in 1910, the first airship certificate to Col. Capper in 1911, and the first glider certificate to C. H. Lowe-Wylde in 1930. In addition to these "firsts," a special certificate was issued for the first out-and-home cross-country flight of 100 miles. The first to qualify was Col. S. F. Cody, who flew from Laffan's Plain to Shrewton and back on December 6th, 1911. This special certificate was abandoned when the "A" and "B" licences were introduced after the first world war.



ADOPTED: Production orders have already been placed for the North American B-45, the prototype of which (XB-45) made its first flight at Muroc on March 17th, and is shown here. In layout this fine-looking four-jet bomber resembles the Consolidated-Vultee XB-46, illustrated in *Flight* of February 6th. It has a span of 89.5ft.

News in Brief

EIRE is now included in the Rollason distribution of the Seabee amphibian.

* * *

The Northern Heights Model Flying Club has received permission again this year to use the Hawker airfield at Langley for their Gala Day. The meeting will be held on July 20th and every effort is being made to make it even better than last year's.

* * *

An agreement was signed in London on March 19th between B.E.A. and Trans-World Airlines to form a joint Greek airline with Greek interests. B.E.A. have been negotiating for some time with the Greek Government. T.W.A., who are shareholders in the Greek company T.A.E., have agreed to join forces.

* * *

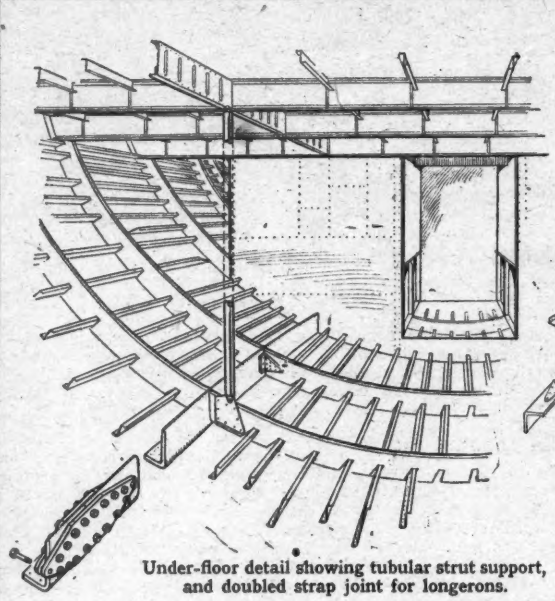
Lt. Col. W. G. H. Miles, European Regional representative of P.I.C.A.O., lost his life in an aircraft accident near Naples on March 8th. After representing the U.K. at the first session of the Communications Division of P.I.C.A.O. he was appointed to the staff of that organization early last year.

* * *

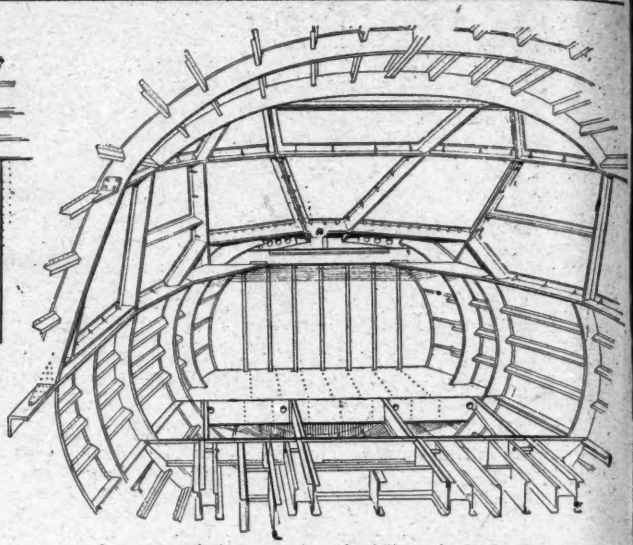
Among the 25 new Fellows of the Royal Society elected last week are A. Cdre. Frank Whittle, for his distinguished work on jet propulsion, and W. J. Duncan, professor of aerodynamics at the College of Aeronautics, for his contribution to an understanding of flutter and related elasticity and vibration problems of aircraft.

* * *

A new instructional film is being made by Technique Film Productions for Rolls-Royce, Ltd. It will be in two parts, the first describing elementary principles and their application to the Derwent V, while the second will be for more advanced students and will explain the design in detail. The film is to form part of the equipment of the R.-R. instructional school at Derby.



Under-floor detail showing tubular strut support, and doubled strap joint for longerons.



Structure of the con ol cabin follows basic fuselage lines although the floor is reinforced and a hefty sill member runs beneath the windscreen.

THE BRABAZON I.

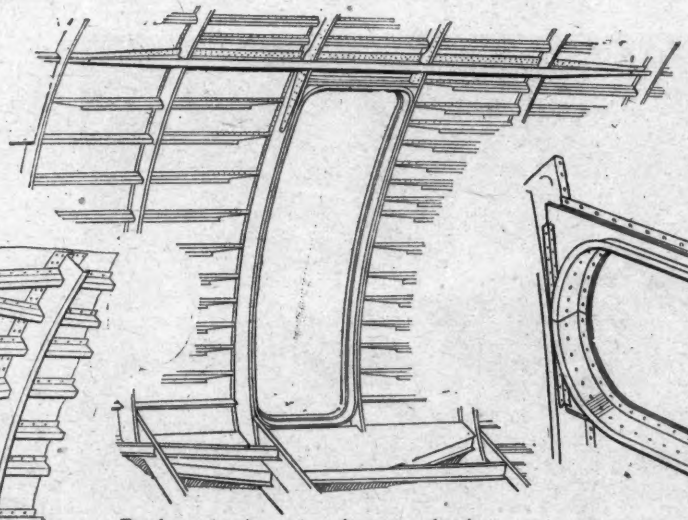
Structural Aspects of the Bristol 167 : Essential Simplicity Without Heterodoxy

ROUND about the end of 1941 it was envisaged by those conducting our struggling efforts that if this country were successfully invaded, our prosecution of the war might have to be continued from afar; from Canada, for example. If such an eventuality ever occurred, aircraft capable of carrying bombs over vast distances would be required.

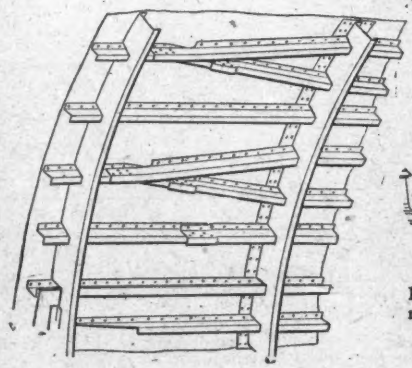
Visualizing this as something which *could* happen, the Air Staff requested our leading aircraft manufacturers to prepare design studies for a bomber capable of carrying 30 to 40 tons of bombs for 3,500 miles. There was, at this time, no suggestion that any such aircraft should be built; it was purely a design study. The Bristol contribution was submitted during the summer of 1942.

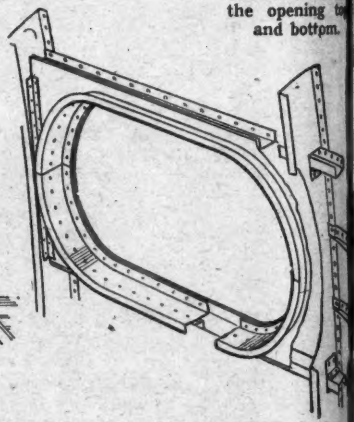
Towards the end of that year, when the Ministry of Aircraft Production were making preliminary investigations of suitable types to fulfil the initial requirements of the Brabazon Committee's category I (i.e., London-New York

Detail of Vee-blending of stringers in fuselage. The right-hand frame in the sketch is shown to pick up the strap of a skin-plating butt-joint.



Typical windo structure, showin channel sectio stringer/longer ons which boun the opening to and bottom.



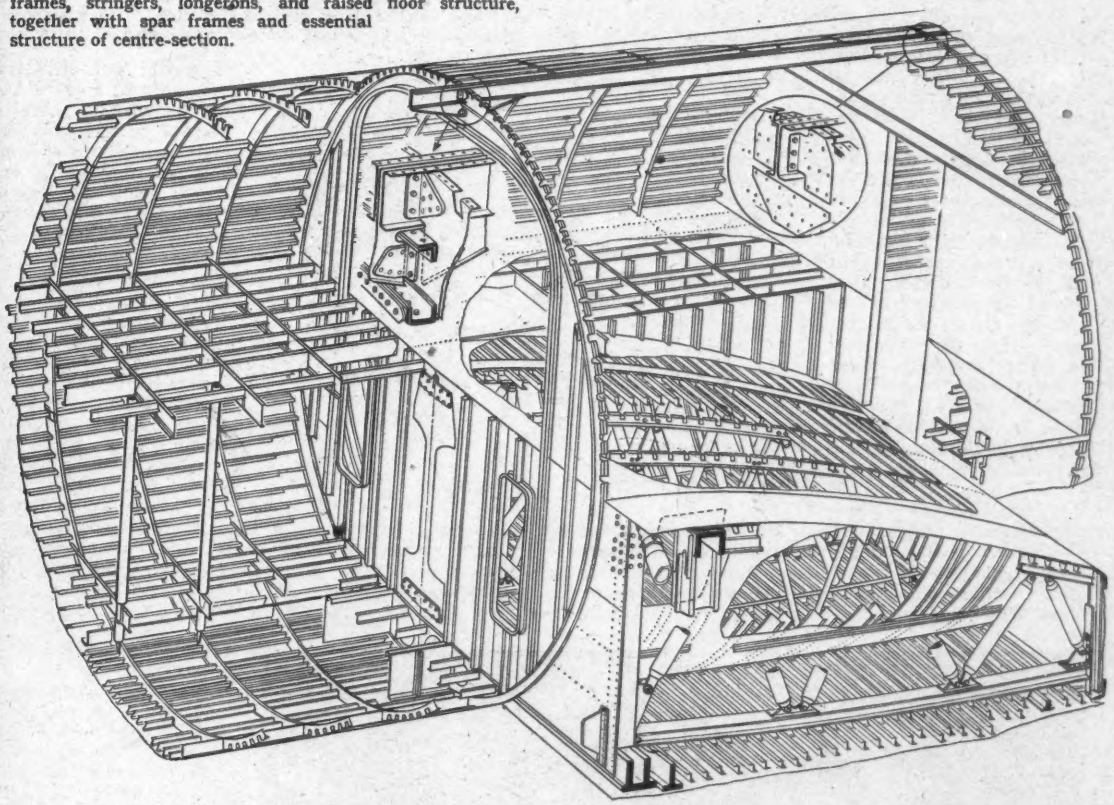


Fuselage structure at a doorway, showing reinforced floor, longeron over opening, and stringer terminations.

non-stop), they considered the bomber design study and found that, broadly, with sundry necessary modifications, it would fill the bill. On M.A.P. suggestion the Bristol Aeroplane Co., Ltd., then started to review the design as a civil aircraft to conform to the Brabazon Committee's requirements. From that point development of the aircraft went ahead—albeit very slowly, since every priority was of necessity, and very properly, given to the company's war commitments. Thus was the Bristol 167 born; and although there is every possibility that the finished aircraft will be accorded some resounding and appropriate name, it is almost inevitable that in most people's minds it will always be known by the title "Brabazon I."

In this article we are attempting no more than an appraisal of the structure of the 167. So mammoth an aircraft as this cannot possibly be accorded the attention it warrants in a single review. We have already dealt with the power installation of the prototype (*Flight*, December 26th, 1946), and other elements of the aircraft will form the subjects of later articles.

Wing centre-section and fuselage juncture, showing fuselage frames, stringers, longerons, and raised floor structure, together with spar frames and essential structure of centre-section.



In very broad outline the design considerations which finally resulted in the 167 can be summarized as follows.

The aircraft is needed for the North Atlantic non-stop service, the Great Circle route between London and New York being roughly 3,450 statute miles. When allowance is made for minor navigational errors and the use of an alternative airport if need be, the total range requirement approximates to 3,750 miles. However, if an aircraft is intended to fly this route non-stop with 100 per cent regularity, the design must cater for prevailing headwinds of up to 100 miles an hour at 35,000 feet. The natural effect of this is to increase the required still-air cruising range to the order of 5,000 statute miles. On top of this, allowances for take-off, climb, and circuits in stand-off periods, together with allowances for engine and aircraft depreciation in efficiency, can easily boost up the equivalent still-air range requirement to a figure exceeding 5,500 miles.

Such range requirements, when related to some sort of effective payload and performance, make an aircraft of Brabazon I size almost inevitable. Having settled on an aircraft of the 300,000 lb category, the weight of the structure and that of the fuel is likely to be approximately four times as much as the payload; it is thus even more important than usual to achieve the greatest possible efficiency. Obviously a light and safe structure cannot be designed without an accurate knowledge of external applied forces and the resulting internal loads in the structure.

It is extremely difficult to obtain this knowledge for a large aircraft by virtue of the great importance of dynamic effects arising from vibrations. The standard way of determining the modes and frequencies of vibration is to resonance-test the finished aircraft, but in the case of an aircraft such as the 167 this method was obviously untenable, and a theoretical method had to be devised for providing the information, the aircraft being idealized for this purpose as an elastic body with 42 degrees of freedom. These calculations were checked by making a one-twentieth scale vibration model, designed to represent the elastic and inertial characteristics of the aircraft, and in point of fact good agreement was obtained with the theoretical results.

Designing to Close Limits

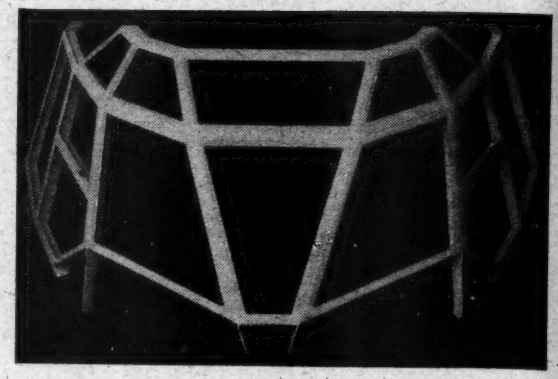
It may thus be seen that in the composition of such a machine as the Brabazon I not only did the operational requirements regulate the aircraft design to limits very much closer than is usual, but the structural make-up of the aircraft is also very closely defined by the dynamic parameters. The fuselage profile gives one of the most graceful body shapes yet designed; a circular section obtains over almost the total length, this basic form being modified only at the nose, where the windscreen causes disruption, and at the extreme tail where the section

THE BRABAZON I.

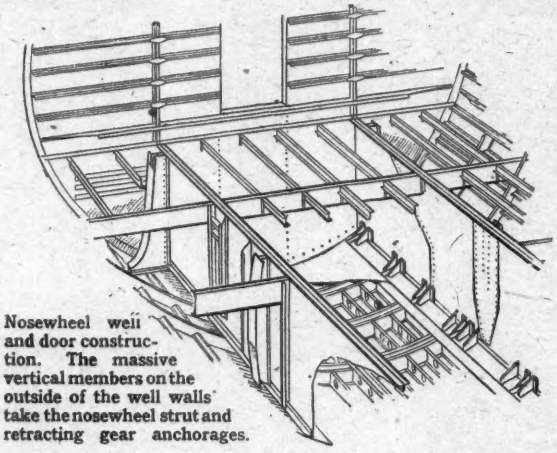
becomes elliptical. Longitudinally only 25ft of the body length is a parallel trunk, this section extending 12ft 6in fore and aft of the rear wing spar; the remainder of the fuselage is gracefully tapered to the respective extremities.

Structurally, the fuselage conforms to a norm almost throughout, the skin plating being carried on Z-section stringers and light, rolled, channel-section frames. Three weights of stringer are used (although all of Z-section), two being extruded and the third a rolled member. This use of three stringer types is a pointer to the very careful watch kept on weight/strength factors in the whole design. The heavier of the two extruded types is used exclusively in the central trunk portion of the fuselage, in way of the wing centre-section where, naturally, the greatest bending moment occurs.

These stringers terminate in pairs gathered into a Vee, at the apex of which the lighter extruded stringers pick-up. Positioning of the several Vee-blendings is symmetrically staggered to conform to the bending moment curve; but the median position is roughly at the centre-section leading-edge nose forward, and a few feet rearward of the centre-section trailing-edge aft. In the rearward half of the fuselage the light extruded stringers only are used; but in the forward half they extend approximately to 18ft forward of the leading edge. Here they give way to the lightest rolled stringers which continue up to the aircraft nose, this being made possible by the rapidly diminishing bending moment in this region.



The pilots' screen is composed of a jig-welded single-unit frame which is glazed with flat glass plates. It is remarkable how little the fuselage contour is disrupted by the screen.



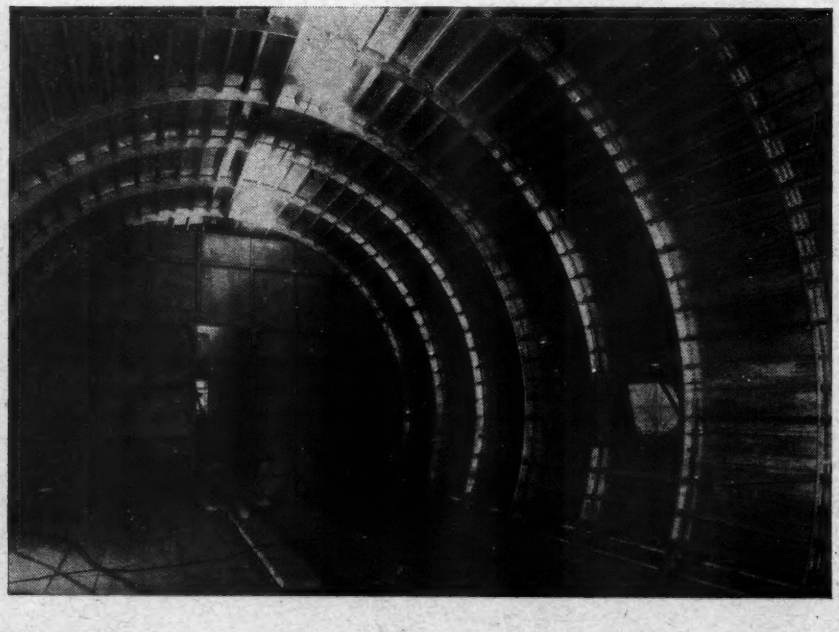
Nosewheel well and door construction. The massive vertical members on the outside of the well walls take the nosewheel strut and retracting gear anchorages.

An interesting sidelight on the stringers, which emphasizes the design preoccupation with weight and stress distribution, is that both types of extruded stringer have their free flanges taper-machined. When it is realized that in the centre-section trunk of the fuselage there are no fewer than 132 stringers, and the machining gives a saving of weight per stringer of the order of 6 per cent, it may be understood how important an item this seeming elaboration is in reality. The fact that the machining is such as to give a tapering flange thickness ensures a gradual change in stringer sectional area and thus avoids any stress concentration.

For the same basic reason of weight/strength factors, the fuselage skin plating is of varied thickness, being 14 gauge in the centre trunk portion and diminishing through 16 gauge to 18-gauge panels at the extremities. Further, standard sheets are produced to thickness tolerances wider than Bristols could accept—in that if too many sheets were near the top limit the aggregate increase in weight would be an expensive penalty—and so special sheets were rolled to tolerances in which the emphasis was in keeping thickness nearer the minimum rather than the maximum permitted. This is exemplified by the following:

	18 gauge	16 gauge
Standard tolerances =	+0.005 −0.002	+0.005 −0.003
Brabazon tolerances =	+0.0025 −0.003	+0.003 −0.004

Whilst dealing with the fuselage skin plating it is convenient to record the equally specialized treatment accorded the pressurizing aspects of the problem. To save weight it was decided to eliminate inter-surface protection and sealing at skin joints, and this as a consequence made it imperative that the quality of riveting should be beyond reproach. To this end a system of grading standard rivets into four actual sizes for each



Fuselage interior looking forward to crew's quarters and flight deck. Frame and stringer formation is admirably shown.

THE BRABAZON I.

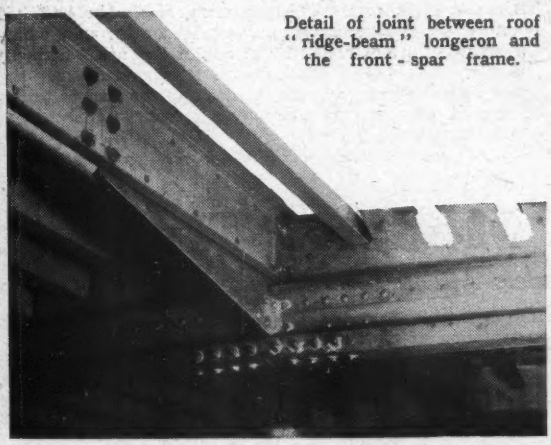
nominal size was adopted, and the rivets then issued with the appropriate drill for the particular batch of rivets supplied, so ensuring that every rivet was a satisfactory fit in its hole. Additionally, ratios of stem length to diameter were established which gave the best head form, and these were closely followed by the riveters.

In this fashion an effective insurance against pressure leakage is made by what can be termed purely structural methods. Reliance on pressure-sealing is, however, vested in the covering of all joints between skin panels with a rubber-base solution, Peratol, which is sprayed on and cures, or hardens, after contact with the air. All transverse skin joints are made as butts with an internal strap; and all longitudinal joints are lap-type.

Fuselage Construction

There are three main longerons in the fuselage, one on the roof centre-line and the other two low down on the base curvature. The "ridge-beam" is made up of two light rolled channels placed back-to-back to form an I-beam; but the bottom longerons are L-section extrusions, the lower arm of the L being curved according to the skin contour. Above and below the windows run extruded channel stringers-cum-longerons.

The floor runs at much the same level throughout the



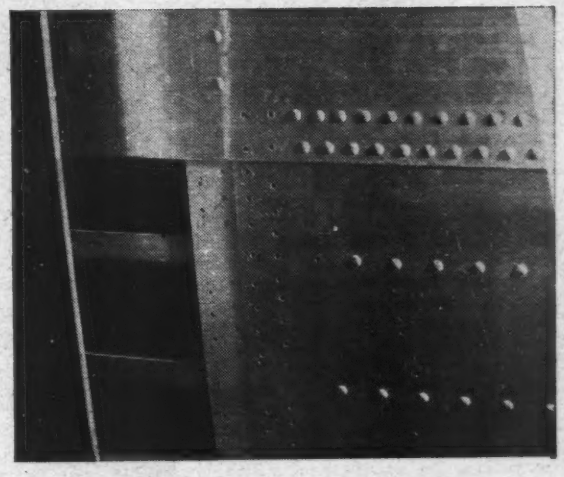
Detail of joint between roof "ridge-beam" longeron and the front-spar frame.

fuselage except (i) at the flight deck and tail end, where it is raised a few inches, and (ii) in the central trunk portion, where it is raised to a height tangential with the wing centre-section top surface. Beneath this central floor, and forward of the centre-section front spar, is the galley (or kitchen perhaps in an aircraft of this size), whilst above is the bar lounge.

The floor structure is simple and very light, comprising transverse channel beams forming a chord of the fuselage frame arcs, and made up of plate webs with extruded angle flanges. These beams are spanned by rolled Z-section fore and aft intercostals riveted to the beam webs with shear cleats. Each alternate transverse beam is supported by vertical tubes picking up at the foot to a frame and stringer.

Five bulkheads divide the fuselage. The first occurs at the rear of the flight deck, and is stabilized on both faces with large extruded members, those on the forward face being of channel-section and those on the rear face Z-section. Vertical posts of channel-section—which become I-section lower down—are fitted on the rear face and pick up to the side walls of the nose-wheel well.

These side walls are diaphragms which pick up to the vertical flanges of the main longerons and are finished at their top edges with L-extrusions forming T-booms. The nose-wheel well extends back about 11ft from No. 1 bulk-



Longitudinal skin joints are all lapped downward, whilst vertical joints are of butt-type to an internal strap.

head, and one frame aft of the well's rear transverse wall is the second bulkhead to which the side walls of the well extend. No. 2 bulkhead has a flush forward face, the vertical and horizontal Z-extrusions for stabilizing being on the rear face. However, channels which blend into I-sections are fitted vertically on the front face to pick up the nose-wheel well side-wall extensions, and about 7ft 6in above the floor an extruded lintel member of Z-section is also fitted on the forward face.

The third bulkhead is a fairly light structure stabilized with vertical and horizontal rolled Z-strips on its after face, and fitted with square-section hollow extruded door frame-posts of light gauge. Immediately aft of this bulkhead is a staircase leading down, port and starboard to the galley, and a central staircase leading up to the bar lounge.

Special Spar Webs

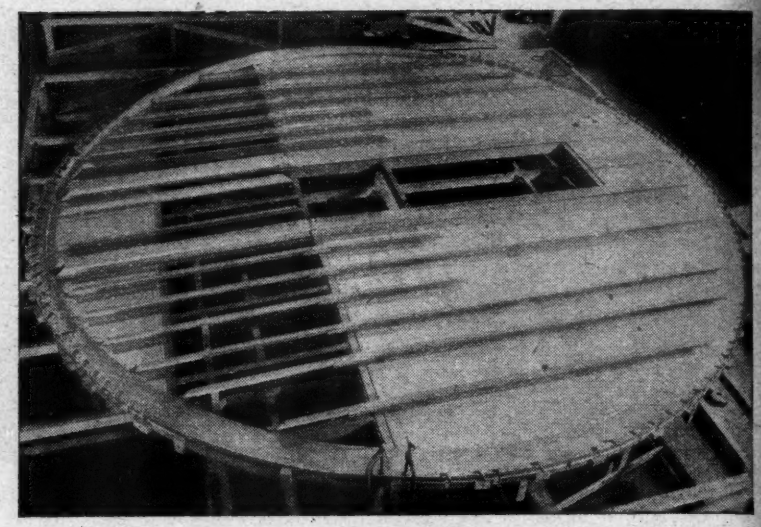
About halfway along the fuselage trunk portion, where the front spar passes through the body, it is formed with a diaphragm web for pressure-sealing purposes, and this web is carried up on each side in crescent-like arms to form a "horseshoe," the tips of which are brought together on the roof centre-line. The periphery of the member is bounded by a solid extrusion of large dimensions which, of square-section centrally on each side, is progressively machined away to an L-section at top and bottom. The interior profile of the horseshoe is bounded by a channel-

Stringer joint at rear pressure diaphragm showing "sword" fittings piercing the diaphragm periphery.

THE BRABAZON I.

section member, and to port and starboard on the forward face a box-section vertical stabilizer is used.

At the rear-spar station a not dissimilar fashion obtains, in that the spar web is formed as a pressure-sealing diaphragm which is integral with the bulkhead (No. 4). On its forward face the bulkhead is flush, except for a channel lintel member above the doorway, but the rear face is stabilized with vertical Z-section extrusions. The rear spar proper is raked 3½ deg. to the vertical, and the vertical stabilizers and peripheral boom of the bulkhead have therefore to be broken at the spar top-boom line. The peripheral boom is a massive T-section extrusion, the scantling of which is greatest at the joint (made with double straps, one each side) and quickly tapers in size and thickness until it is strapped to a lighter L-section at about 10 and 2 o'clock. The diaphragm itself is connected by means of a peripheral doubling plate to an annular L-member which the stringers pierce, and which is riveted to the skin.



Rear-spar frame bulkhead under construction. Note how the lower sector (at left) cranks to conform with the centre-section spar rake.

Last of the bulkheads, No. 5, is actually the rear pressure diaphragm, and on its forward face are built massive box-section stanchions to the top ends of which the feet of the fin front-spar attach. At the base of the stanchions is a transverse box member immediately beneath floor level. An access hole is provided in the diaphragm, framed on the forward face with large channel-members for stiffening and sealing. On the rear face are several extruded Z-section horizontal stabilizers. The periphery of the bulkhead is bounded by a Z-section annular member through which the stringers are attached by means of "sword" fittings; these are leaf-shaped blades with a central flange, the stringers being riveted to the blades and the flanges to the annular Z-member. In this way a pressure-tight passage of the stringers is effected.

(Another instalment will be published next week.)

Coachmakers of Modern Times

Aircraft and Automobile Leaders Attend Livery Dinner

BY adapting their ancient fabrics to modern industries, the Livery Companies of London are enjoying new life and vigour. Last week the Worshipful Company of Coachmakers and Coach Harness Makers held a Livery dinner at the Mansion House to meet the Lord Mayor and Sheriffs. The Master, Mr. C. W. Mallord Turner, presided over a brilliant gathering.

In days gone by (the Coachmakers Company received the Royal Charter in 1677 in the reign of King Charles II) the guilds ruled their craftsmen with much firmness and enforced good workmanship by fines, threats, or even imprisonment. To-day the Coachmakers Company, rich in tradition, is mainly composed of leaders in the automobile, aircraft and ancillary industries whose aim is still to advance technical design and construction. Guests on this occasion included, besides the Lord Mayor and Sheriffs, Lord Nathan, Mr. Justice Willmer, Air Chief Marshal Sir Philip Joubert, Viscount Knollys, Major General C. A. L. Dunphie, Major General Brander and Sir Archibald Rowlands.

The loving cup having gone its ceremonial round, speeches of a high order followed. Mr. Archibald Hair proposed the toast of the Lord Mayor and Sheriffs to which the Lord Mayor Sir Bracewell Smith responded, adding a wise plea that in the National interest to-day, sectional interests should vanish and all talent and skill combined for the National good.

Lord Brabazon was, as usual, amusing and witty in proposing the Worshipful Company of Coachmakers, reviewing its history and ancient traditions, and the inevitable transformation to the swifter automobile and now aircraft interests. He traced the progress of coaches which originally cost £34 and four horses £11, to pneumatic tyres and the aerodynamic designs we use to-day. He even jokingly visualized long-distance flight, which he thought was so dull, as offering a possibility of carrying doped and boxed passengers on their travels through the stratosphere.

In his reply the Master told of the growth of the Company to its present total of 208, their co-operation with the Institute of British Carriage and Automobile Manufacturers in the presentation of medals for body design contests and hinted at an extension of awards by the Company for aircraft, if design had not become too perfect in the interim.

"The Guests" was proposed by Sir Frederick Handley Page who advocated as the best British watchword, quality rather than quantity, and an improved standard of training for young technicians. Fresh from America he had answered over there many criticisms of our Government and what we were doing in this country. "Don't run us down," he pleaded with them. "Our Government did what the Germans failed to do in years of effort. They shut down our industries for three weeks!"

Air Chief Marshal Sir Philip Joubert reiterated the importance of technical training not only for industry but also for the Services. He reminded his audience of the immense quantity of goods that aircraft could handle, instancing the million tons of supplies carried by air during the Burma campaign. He felt that in the future we shall live by civil aviation, and, by the quality of our products, impress ourselves upon the world.

G. S.

STEEL FOR TURBINES

THAT jet propulsion owes much to the metallurgist is well known; a glimpse of just how much was revealed in the paper presented by D. A. Oliver, M.Sc., and G. T. Harris, M.A., of the research department of Wm. Jessop and Sons, Ltd., to the West of Scotland Iron and Steel Institute.

Development of austenitic steel for gas turbines, especially with high creep strength in mind, was traced from the beginning, and the paper gives particulars of many steels, culminating in the G.18B which has the following composition in weight per cent: Carbon, 0.4; manganese, 0.8; silicon, 1.0; nickel, 13.0; chromium, 13.0; cobalt, 10.0; tungsten, 2.5; molybdenum 2.0; niobium, 3.0. An even better steel, G.32, is now undergoing development. At 750 deg C it has a creep strength about 75 per cent higher than that of G.18B.

HERMES V

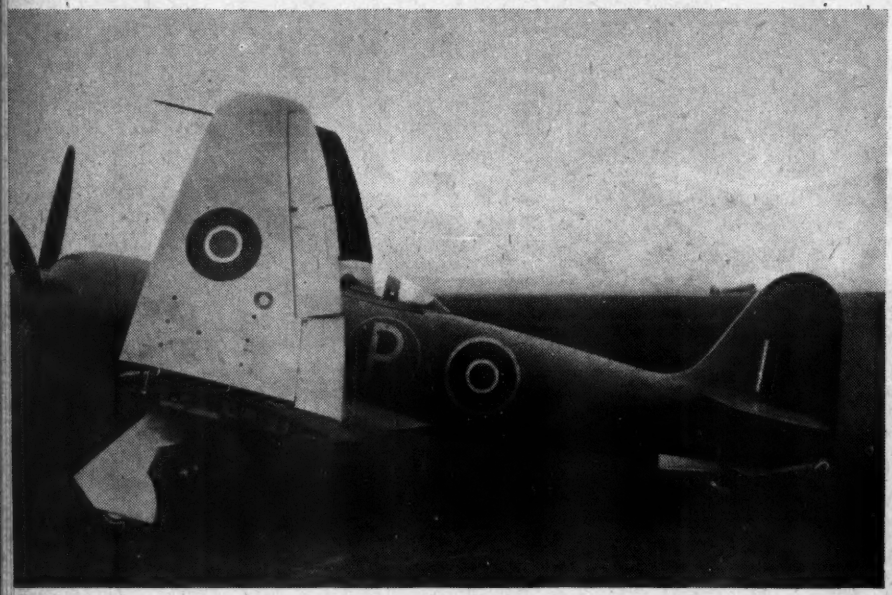
Powered by Bristol Theseus gas turbines aggregating nearly 10,000 equivalent take-off horsepower, Hermes V will have a cruising speed of 343 m.p.h. and will carry 63 passengers through the sub-stratosphere

HANDLEY PAGE

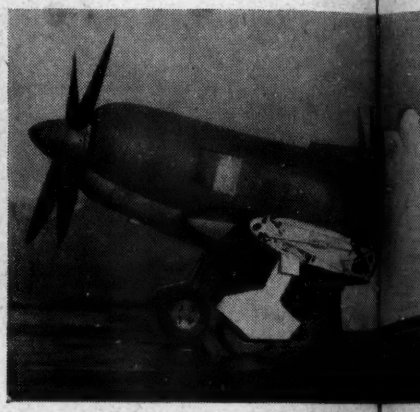
HANDLEY PAGE LIMITED, LONDON, ENGLAND

FASHIONS IN FOLDS

Methods of "Trimmin" British Naval Aircft for Stowage Abord Carriers



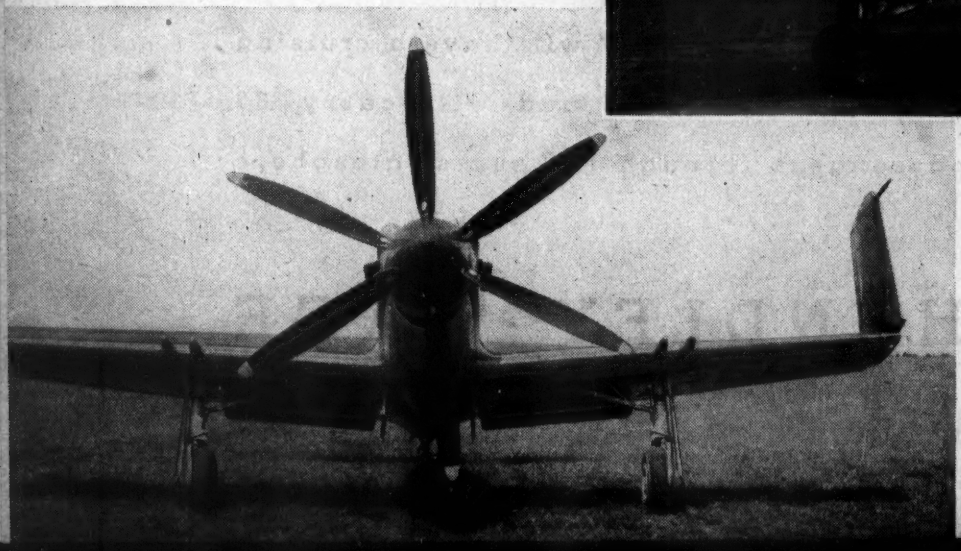
The folding point on the Hawker Sea Fury X is immediately outboard of the gun bay. Power folding is accomplished by hydraulic jacks.



Problems of folding the Blackburn Firebrand we accentuated because when the type was desig permissible dimensions were considerably less than were later allowed.

THE collection of views on these pages illustrates the various solutions to the wing-folding problem evolved by designers of British Naval aircraft. Folding has always been something of a *bête noir* for although it may not necessarily be difficult in itself it must be accomplished without prejudice to other qualities demanded of a sea-going aircraft.

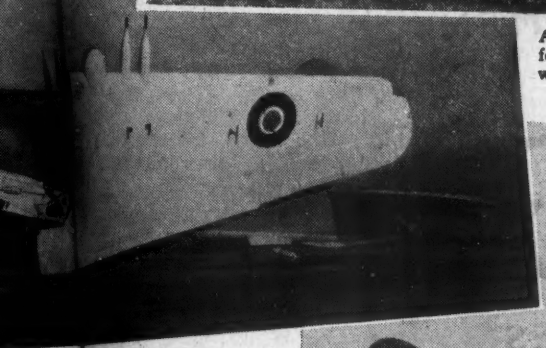
Weight inevitably increases, by something like 1½ per cent of the all-up figure for a manual-folding system, or by an appreciably greater amount if power-folding is used This latter system, now being incorporated on fighters, is of great value in reducing the time between the touch-down of an aircraft on the deck and its positioning on the lift for transfer to the hangar. The rate at which a number of aircraft can be landed-on and stowed may govern the period of time for which a carrier may be required to remain out of station in a naval force.



Power folding of relatively small ou board wing panels was incorporated o the Supermarine Seafang 3 (lef Though a large twin-engined machi (span 59ft. 11in.) the Short Sturge (above) folds to only 20ft. The folde width of the Fairey Firefly IV (righ is appreciably less than its 16ft. ta plane span.

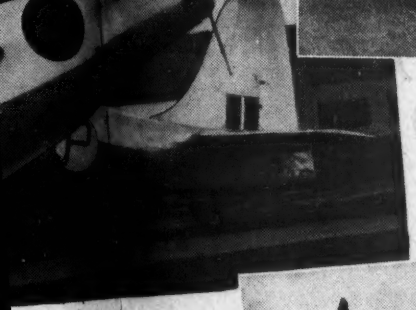
mit"
ircft
board

A clever power-folding scheme for the de Havilland Sea Hornet was evolved by the Heston Aircraft Co., Ltd.

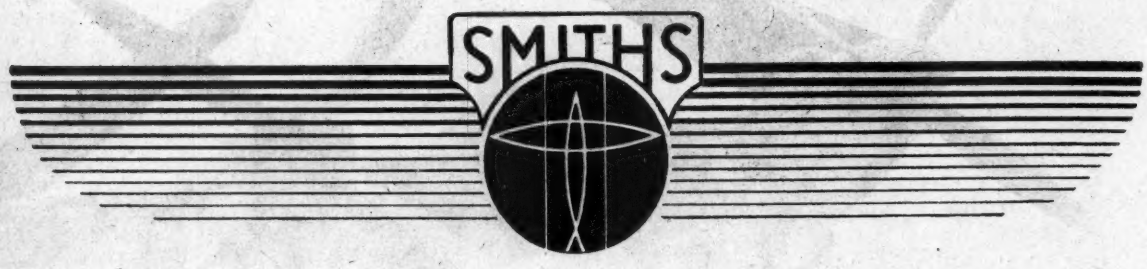


Firebrand w
e was desig

Like its "opposite number" the Sea Fury X, the Supermarine Seafire 47, last of the Spitfire derivatives in production, employs vertical folding.



of relatively small out-
els was incorporated on
ne Seafang 31 (left).
twin-engined machine
n.) the Short Sturgeon
only 20ft. The folded
airey Firefly IV (right)
ess than its 16ft. tail-
ane span.



SMITHS

AVIATION EQUIPMENT AND

K·L·G

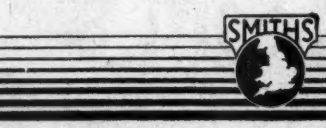
THERMO-COUPLES & IGNITER PLUGS

are used on the

Bristol THESEUS

THE FIRST PROPELLER-TURBINE ENGINE TO PASS THE OFFICIAL 100-HRS. SERVICE TYPE TEST

K.L.G. ENGINE AND IGNITION ACCESSORIES ARE A PRODUCT OF SMITHS AIRCRAFT INSTRUMENTS LTD CRICKLEWOOD WORKS, LONDON, N.W.2, THE AVIATION DIVISION OF S. SMITH & SONS (ENGLAND) LTD



Air Estimates Debated

Future Weapons : Transport Command : Real Interest in Reserves and W.A.A.F.

THE present position, as affecting the establishment and efficiency of the R.A.F., was clearly stated by Mr. Philip Noel-Baker, Secretary of State for Air, when he introduced the Air Estimates in the Commons on March 17th. His overall summing-up mitigated such technical ambiguities as his reference to "guided rockets, against which aircraft may be the sole protection."

More important than supersonic aircraft and homing air-to-air missiles was the revolutionary change in warfare caused by atomic energy, which was less costly in proportion to its destructive power than any other weapon. There might be other means of warfare both more effective and even cheaper.

It was no good in this transition year, the Minister considered, trying to guess about the changes which might come, and we must seek now to learn the true lessons of the last struggle. He was not sure that it was fully realized what a dominant factor air warfare had become and he recalled how, in the spring of 1945, the Allied air offensive had completely disrupted German economy, so that Speer was obliged to report to Hitler that the final collapse of German economy could be counted on within four to eight weeks and that after this, military continuation of the war would become impossible.

Work of Transport Command

The Air Minister had a very special word to say about Transport Command. It would be hard to overestimate what the Command had done in the last twelve months. To-day it was running two passenger services a week to Warsaw, two to Belgrade and Budapest, three freight services to Vienna, three passenger services to Bucharest, and one to Sofia. It ran five services a week in both directions to Singapore, two to Cairo, and seven freight services to Delhi. In addition to flying training it was providing airfield lighting systems, lighthouses, beacons and G.C.A., in the operation of which it was training civil crews. Thus a heavy burden had been imposed on the R.A.F. In the development of new navigation and landing equipment priority was given to that which would help civil as well as military flying. Without the R.A.F. Air Traffic Control Organization no aircraft could fly on the Empire trunk routes. Discussion was taking place with the Minister of Civil Aviation to discover how a major relief for the Air Force might soon be brought about.

Mr. Noel-Baker went on to describe the splendid survey and police work lately undertaken by the R.A.F. and rightly followed it with a statement on demobilization. By the end of this month, he pointed out, nine out of ten of the skilled and experienced personnel who made the Air Force and fought the war would be released. The Force was so unbalanced, and the shortage of top-grade mechanics so great, that it was difficult to give squadrons the required flying time. A large part of the Force was necessarily engaged upon training.

After outlining the plans for improvement in living conditions Mr. Noel-Baker said it would be less than fair to the Service to claim that we could offer them all that we would wish to offer them to-day. Next to conditions of life and service he believed that education was of most importance at present.

In future the avenues of promotion for airmen would be far wider. Many more officers would be selected from the ranks; all short-service officers in the General Duties branch would be taken from aircrew, and a substantial proportion of permanent commissions would be offered to officers on the short service list.

Business Technique

It might be asked whether modern business and industrial technique should not now be applied to transportation and administration, to bring about great economies of manpower. He thought this possible, but added the warning that the R.A.F. was not an industry or a business but a defence machine. It must work not only in large home stations but in small stations overseas.

Having discussed servicing and maintenance and the scientific use of manpower, the Minister turned to equipment, in which matter we had to keep a balance between rigid conservatism and vague crystal gazing. We were confining our provision of new types to the minimum essentials—fighter defence, maritime reconnaissance and strike, transport, and training. In the coming year the Meteor III would be replaced in fighter squadrons by the Meteor IV. These new high-speed machines made it necessary to have new training aircraft and to reorganize training methods. That, he claimed, had been done, but he made no mention of specific types of training aircraft.

Despite the fact that in their thousands of predictions in the last eight weeks the "luckless men" of the Meteorological Office had been invariably right, meteorology still left much to be desired.

Auxiliary Squadrons

A. Cdre. Harvey hoped that the Minister would always insist on quality instead of quantity. The £215,000,000 we were now spending was cheap insurance. Forty instead of twenty auxiliary squadrons should be formed. There was only one A.A.F. squadron south of London and he was quite sure that there was room for three. He asked for encouragement for the A.T.C. and pointed out that the Air Force was the first Service to have a youth organization, and that it paid tremendous dividends.

A. Cdre. Harvey wished to know what was being done about types of aircraft other than fighters, and whether squadrons were getting sufficient flying time. He felt that the Dominions should pay more than they did for the benefit they were getting from our fighting services, and advocated the formation of auxiliary squadrons in such places as Hong Kong, Ceylon and Singapore.

G/C. Wilcock said that meteorological facilities in Africa were appalling and wondered if the scientific side of meteorology should not be left to the universities.

We did not seem to have produced a really successful type of large passenger aircraft, and the R.A.F. required a good type for transport work.

There was no black magic in operating over the sea, and G/C. Wilcock hoped that the Minister of Defence might one of these days consider whether the R.A.F. should not take over the duties of the Fleet Air Arm. This would certainly lead to economy and possibly to greater efficiency.

Sir Peter MacDonald questioned whether the staffs of the Ministry of Supply were the most capable people for carrying out research and development for the R.A.F., and held that the customer was the best judge of what he required. We should find that the best designers and technicians would not be civil servants for long because the aircraft manufacturing firms would snatch them up. He thought the Air Ministry staff could be cut by at least 50 per cent.

W/C. Shackleton hoped that we would strive to bring the Air Force and the Navy into closer relationship at the lower level. Would it not be possible, he said, for naval officers to be stationed on Coastal Command stations?

"Maritime" Command

The use of the word "maritime" instead of "Coastal Command" pleased W/C. Shackleton. He hoped the R.A.F. would have a large hand in the responsibility for the development of guided missiles and similar weapons.

Mr. Gerald Williams said that we must have aircraft to drop the atom bomb wherever it was wanted. (W/C. Millington said that it was not usually wanted—at any rate by the recipient.)

Mr. Williams went on to explain that flying bombs and rockets needed to have big installations and bases, thereby displaying a deplorable lack of knowledge of German technique.

W/C. Millington spoke of the danger in which the R.A.F. might become involved by committing itself, through promises, to young recruits, opening up vistas of a certain kind of career which might be closed to them in the very near future. He could not see why we could not have an almost complete integration between Transport Command and the civil aviation services.

Mrs. Nichol gave an account of the record of the W.A.A.F. and referred to the extended service scheme. Women, she maintained, felt that they should have equal pay for equal work, and a great number of them would like to fly as non-combatant pilots.

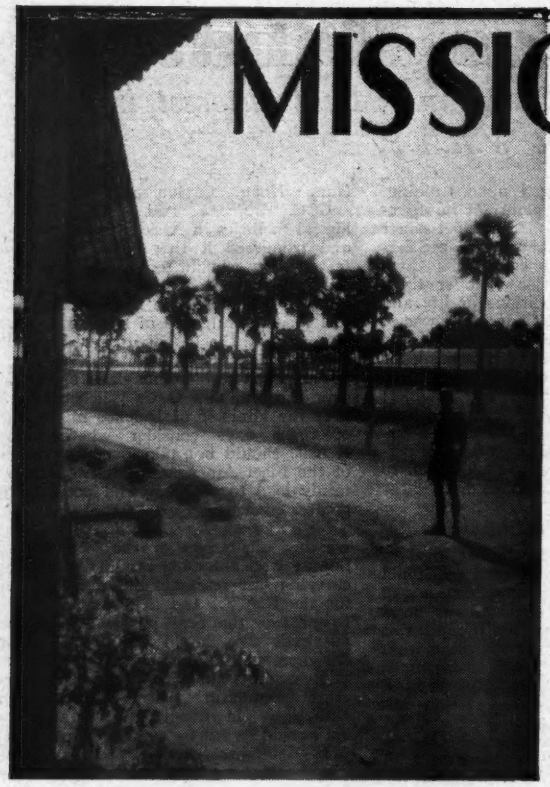
A. Cdre. Harvey suggested that the Air Ministry should review the matter of ferrying aircraft. It might be necessary to organize a service known as the

(*Continued on page* 273.)

MISSION to INDIA

Part IV—Thoughts on the Monsoon: "Cu-Nim Indicators": Back to a Snow-bound Britain

By H. A. TAYLOR



Tambaram from the mess verandah—with a "cu-nim" forming in the N.E. monsoon.

IN this strange world of India where dozens of human beings wait noisily and even quarrelsomely to do, perhaps, a two-anna service—the lucky one usually padding off, in a private cloud of dust and loaded to the eyeballs, in quite the wrong direction—and where the marble halls of administrative buildings may be patchily blackened by the tiny lunch-cooking fires laid haphazardly in the fairways, it is stranger still to find airlines running with a shiny appearance of efficiency. The contrast between the sight of forty-five thousand pounds worth of flying machinery, crewed by a neatly uniformed team, leaving the apron on its way to the end of the runway, and that of the ox-cart, moving at its pre-ordained mile-an-hour on the road behind the terminal building, is almost unbelievable to the newcomer.

There is no doubt that, for at least a part of the year, India is a near-ideal flying country. But for the rest it is extremely uncomfortable and sometimes dangerous. The difference between the two conditions is so extreme that one almost wonders whether radio and radar aids are worth the cost of installation and operation—though, if monsoon-flying is to be seriously attempted, radar scanners for picking out dangerous cumulo-nimbus clouds are an almost essential part of a long-distance airline aircraft's equipment. It would seem that such a radar aid could be applied during the next year or so—though whether its cost and weight will be prohibitive remains to be seen.

Our flying in India was being done during a period in the winter when conditions could hardly have been better. The worst weather we met was the effect of the feeble north-east monsoon down the east coast—producing "cu-nims" of no mean proportions by British summer standards, but babies, apparently, in comparison with those met during the real south-west affair of the Indian summer months. But even the little ones we met were, when occasionally entered, far more turbulent than those of a similar appearance in this country. In areas not yet reached during the hot season by the monsoon, the heat bumps, too, can be very uncomfortable; I am told that, over the Sind desert, an aircraft may not be clear of such thermals even when flying at heights of the fifteen-thousand-foot order. Which makes things rather difficult for the operators as well as the passengers.

The need for radar "cu-nim recorders" is not only for night flying, when such clouds cannot be seen and avoided, but also for those periods when the monsoon produces a continuous layer of stratus through which the "cu-nims" rise unseen. Apparently the density of these is amply greater than that of normal cloud, so that they appear well-marked on a radar screen—almost as well-marked, in fact, as solid ground, and the more turbulently dangerous the cloud the heavier is the consequent indication. The idea at present seems to be to offer a P.P.I. indication which gives an idea of the type of "obstruction" and its relative distance from the aircraft—a plan-view, so to speak, ahead. Items which are safely below the aircraft's flying height will obviously cease to give any response on the screen as they are approached.

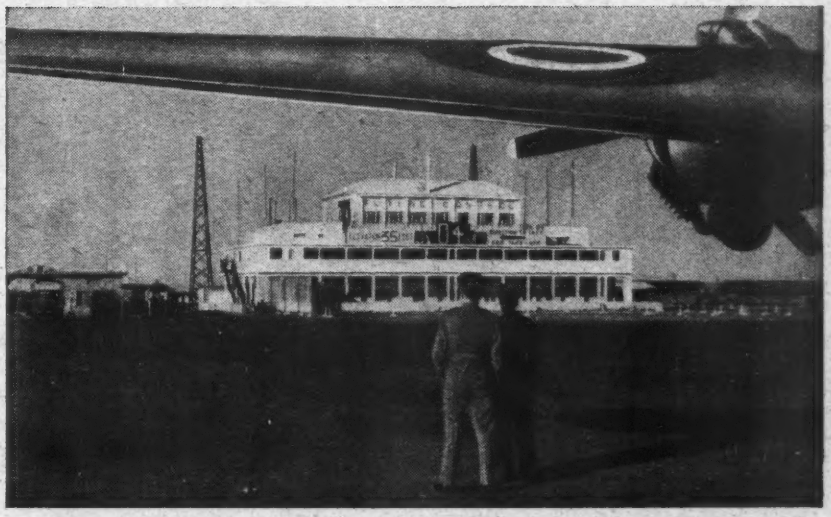
Monsoon-flying Conditions

All of which is intended to give other laymen in such matters some slight idea of the sort of difficulties which are daily faced by airline, Transport Command and other crews during quite a few months of the year. My own ignorance of monsoon-flying is exceeded only by my interest in it. Except for a few comparatively brief periods the Halifax, as I've already remarked, was flown in near-cloudless conditions of fifty-mile visibility. Indeed, while making the trip between Palam, Delhi, and Peshawar, on the North-West Frontier, we had a clear view of the Karakoram Mountains, with the redoubtable and ill-famed Nanga Parabat, as they lay some two hundred miles or so to the north of our track. Unfortunately, while flying from Ambala to Ranchi, a fighter station "near" Calcutta, slight haze rose well above our operating height and we were unable, because of the position of the sun at the time, to catch even a faint glimpse of the more impressive eastern section of the Himalayas. Indian National Airways, incidentally, fly up to Peshawar, and they, too, presumably, must use the corridor and fly at 7,000ft all the way in.

In contrast with conditions on the outward flight, the return journey to England was made exclusively by daylight—since time was, all the while, being "saved" rather than lost. On the other hand, though we had had, for the greater part of the trip, favourable winds on the outward journey,

THIS, the fourth and last article by our representative, who accompanied an Empire School of Air Navigation Mission on a flying visit and tour of R.A.F. and R.I.A.F. stations in India, deals at some length with flying conditions and the need for radar to warn pilots of dangerous clouds ahead. The return journey to England from Karachi to Cornwall is also described.

those on the return were quite strongly adverse. The non-stop run from Karachi to Lydda, for instance, took ten hours or so, even while flying at maximum economical boost, and one thought with sympathy and in admiration of those sturdy long-distance pilots of the pre-war years, sitting hour by hour in their Moths and things; the very idea of spending forty-eight hours in the pilot's seat of a record-breaking Wellesley seemed impossible by the standards expressed by our cramped and aching limbs. As I've said in a previous article, an hour or two of oxygen-application makes, in my opinion, all the difference to one's bodily comfort. And it is not as if, anywhere between Tripoli and Karachi, there is a place other than the pre-ordained airfields where one can land a light aircraft and stretch one's limbs for half an hour or so. No coasts can be so inhospitable as those of Baluchistan or of the Persian Gulf, while even the pipeline to Palestine provides meagre comfort and the Libyan Desert none.



On the tarmac at Mauripur, Karachi, with the impressive flying-control building in the background.

Between Jiwani and the Oman peninsula the navigators amused themselves by plotting some pressure-pattern position lines with the aid of the radar altimeter. For these, the same basic pressure-pattern-flying formula is used. This, $Zn = \frac{21.47(D_2-D_1)}{\text{Sin } \phi \times \text{T.A.S.}}$ was explained in an article on P.P. flying which appeared in *Flight* of September 5th, 1946, only in this case the D2 and D1 are the relative differences at two points between the readings of the pressure and radar altimeter. Naturally enough, such position lines can only be plotted over the sea or over ground which is known to be sufficiently level for the radar altimeter "actuals" to be calculably correct. The lines obtained were not very reliable since the difference in the height readings was small, but they showed us to be well south of our track. And, in fact, after flying over the cloud-covered peninsula and obtaining a series of running QDMs from Sharjah, this proved to be so.

These QDMs were obtained on V.H.F. from the "homer" station and were exceedingly accurate. Incidentally, local V.H.F. reception could often be almost unintelligible, and this is a point worth consideration when pondering on the advantages or otherwise of Ground Controlled Approach systems. Experienced though the controller may be and however accurate his talk-down on a basis of perfect P.P.I. indications, none of it will be of much use if the approaching pilot is unable to hear him properly and must continually demand a repeat. And, with all the radio and radar aids which have been devised in the last few years, there is nothing quite so comforting and useful as a series of plainly spoken QDMs. In the bad old days—when the accident rate was, nevertheless, low—people used R/T QDMs by which to make semi-blind approaches, while, metaphorically speaking, Jimmy Jeffs held his head out of the control tower and remarked "motors west" or "motors over," as the case might be, by way of guidance.

After flying through a couple of minor fronts over the Libyan Desert, we landed at Castel Benito to learn that the weather over the last stage of the journey would be ten-tenths all the way, with icing more or less at ground level. On the following morning, therefore, we were routed to Istres, near Marseilles, there to await a more favourable story. As it happened, the original report had been pessimistic, but we were still prevented from making Shawbury—for the very simple cause that this, and many other airfields were unserviceable by reason of the snow and ice which had beset England during our tour.

Since Gloucester control could not be persuaded, we were duly routed to St. Eval, near Newquay, and this stage from Istres proved to be the most useful bit of practical navigational endeavour of the entire trip. Within a quarter of an hour of leaving Istres the ground was totally obscured, and remained so until we were a few minutes short of our E.T.A. Thanks to good Gee fixes and the use of H2S over the French and English coasts, we hit St. Eval—or, rather St. Mawgan, which is next door—absolutely "on the beak." The cloud layer had broken a few miles away from the north coast of Cornwall to show us an almost snowless landscape.

AN HISTORIC OCCASION

MARCH 22nd, 1947, may well in future years come to be looked upon as an historic occasion. On that day the Helicopter Association of Great Britain held the first of what it is hoped will become a series of annual events: a dinner for members and friends of the Association. The scene was Pimm's Old Red House in Bishopsgate, and Mr. H. A. Marsh was in the chair. After the usual vicissitudes inseparable from the founding of a new body, the Association is now well established, although not very rich (here is a fine opportunity for some well-wisher to render practical help), and counts among its members pretty well everyone who has been connected with or taken an interest in rotary-wing flight.

Mr. H. M. Yeatman proposed the toast of the guests, and Col. Preston, Secretary-General of the Royal Aero Club, and Capt. Laurence Pritchard, Secretary of the R.Ae.S., responded. Both had words of praise for the Association, and both offered to place a conference room at its disposal. Col. Preston recalled that he had just had the pleasure of issuing the first F.A.I. helicopter pilot's certificate to W/C. Brie, a member who is at present in America. He would soon be issuing No. 2 to Major "Jim" Cordes.

Capt. Pritchard expressed the good wishes of the Royal Aeronautical Society to the Association, and said the members were the people who were going to knock the hell out of helicopters. The slow-landing aircraft obviously had a future, and he had some strong words to say about the modern fixed-wing aircraft landing at speeds so high that only a couple of airports in the world would accommodate them. The helicopter which could fly at 150 m.p.h. and land anywhere at 15-25 m.p.h. obviously was a world-beater as soon as it was sufficiently developed. The Association would take a great part in that development.

THESEUS AIR TESTING

First Bristol Airscrew Turbines Fly in a Lincoln : Some Features Discussed

LESS than two months ago *Flight* reported the successful completion of a full type test by a Bristol Theseus airscrew turbine, and also mentioned that the installation of two such units in a Lincoln was almost completed.

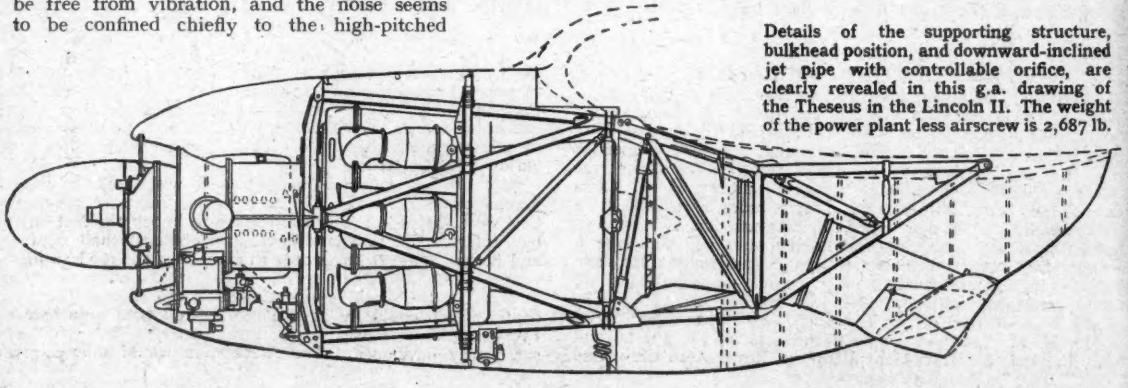
By making a total run of 156 hours, of which 127 were taken up with the official test schedule, the Theseus became the first airscrew turbine in the world to earn this qualification. This fact was duly inscribed on the certificate received from the M.o.S. on January 28th, and bearing the signature of the director of Engines Research and Development, Capt. (E) M. Luby, R.N. Another test is to be undertaken during the next few days in which the take-off rating will be increased.

Some details of the installation of two Theseus power units in the outboard positions in an Avro Lincoln for flight testing are now available. It is a tribute to the keenness and industry of all concerned, particularly the ground engineers, that engines received in the hangar on December 24th and January 10th respectively were installed and running successfully by January 24th. Brief taxying tests were completed by February 6th after numerous delays due to weather, and Mr. Pegg, chief test pilot, finally took off from a snowbound airfield on a short first flight on February 17th. Since that time weather has permitted four or five other flights, and an initial handling schedule of about 25 hours' duration has been commenced.

Preliminary reports show that the Theseus units are functioning very satisfactorily and that they are smooth and quiet. On test on the ground the engines can be seen to be free from vibration, and the noise seems to be confined chiefly to the high-pitched whine of the turbine and a low rumbling from the airscrew.

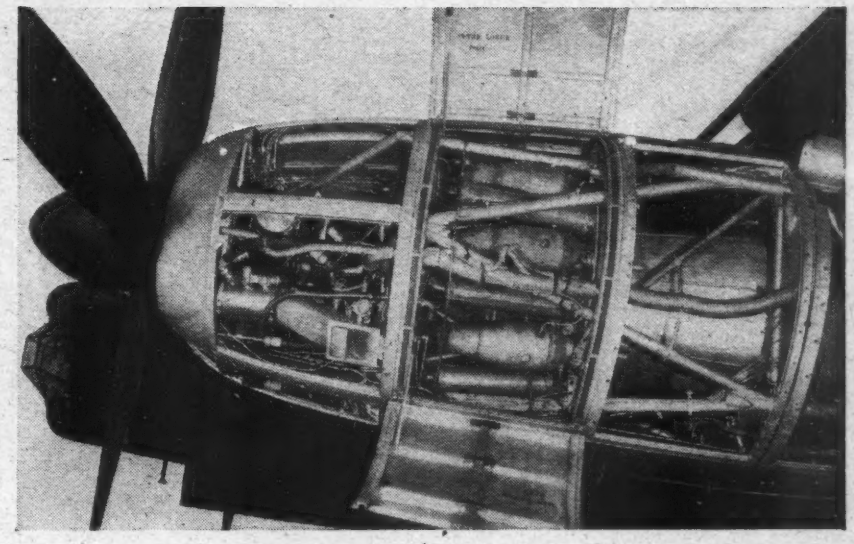
Readers may like to be reminded that the standard Avro Lincoln has a span of 120 feet, an a.u.w. of 82,000 lb, and an empty weight of a little over half that figure. Its four 1,705 h.p. Merlin 85s give it a maximum speed of over 300 m.p.h. at 18,000ft, and its ceiling, a feature of special importance in connection with Theseus flight tests, is 35,000ft. In the Civil Aviation section of this issue may be found an artist's impression of the Handley Page Hermes V in which four Theseus engines are to be fitted. Some preliminary details and figures for this important design are also given. This is the only installation so far announced for Theseus airscrew turbines, but several more may confidently be expected and some preliminary design studies for other possible installations have already been made.

The Bristol Theseus itself was described in *Flight* of October 10th last year. In effect, it is two units in one, a gas generator (nine-stage axial compressor and two-stage turbine) and a separate turbine-driven airscrew. The nature of the "controller," a governing device for maintaining through automatic airscrew pitch control a constant speed ratio between the two turbines, is still confidential pending the granting of patents. Its function is most important and the fixed ratio of airscrew turbine to compressor turbine speed is 1.12 : 1. An infinitely variable gas coupling development is foreseen which might have many interesting effects on the operating conditions of the engine. Incidentally, in giving figures for engine speed the compressor r.p.m. are always stated. For example, the engine



Details of the supporting structure, bulkhead position, and downward-inclined jet pipe with controllable orifice, are clearly revealed in this g.a. drawing of the Theseus in the Lincoln II. The weight of the power plant less airscrew is 2,687 lb.

THESEUS AIR TESTING

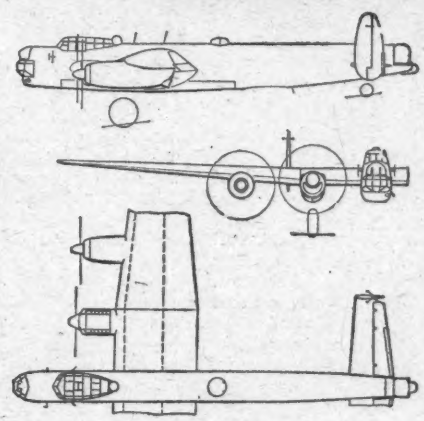


All components are readily accessible within the neat Theseus nacelle due to the provision of numerous hinged panels with quick-release fasteners.

cruising speed might be given as 7,800 r.p.m. From the fixed ratio the airscrew turbine speed may be calculated as approximately 8,730 r.p.m. As the airscrew reduction gear ratio is 0.119:1 the airscrew speed for cruising is 1,040 r.p.m.

It has been determined that a wide band of operating speeds might be used for the airscrew turbine without appreciable alteration of power output. This fact may prove most useful on civil transport in keeping down airscrew r.p.m. and therefore noise.

The first Theseus designs were prepared as a part scale model of a considerably larger power unit, but early promise and an estimate of probable demand for this size of unit led to its individual development. A much larger version in the 5,000 h.p. class may still follow later. The decision to develop the Theseus was a good one and, although no specific installations have been announced except the Handley Page Hermes V, the recent request of the M. of S., following the successful type test, that the engine be put into production, is a most significant confirmation.



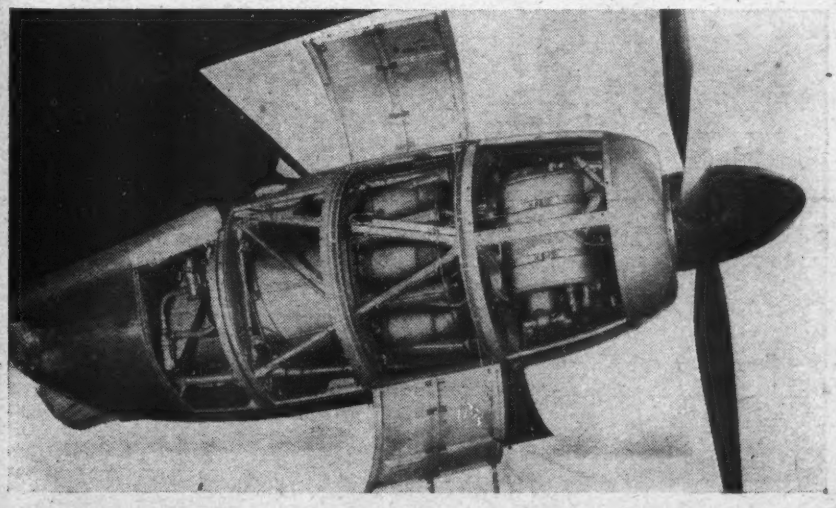
G.A. of Theseus Lincoln

When first considering the design, the Bristol Company paid special attention to economy, and the relatively low compression type unit with heat exchanger was chosen for first study in preference to the highly stressed high-compression alternative. The economy must therefore come primarily from heat recovery. The decision matches up with Bristol piston engine policy, power and economy being obtained with low boost pressures. In passing, it is noteworthy that no fewer than 57,400 Hercules engines were produced during the war years, and the Company regard this engine with its excellent reliability and economy of operation as having set a standard for all Bristol power units.

The Theseus is fitted with a torquemeter as are recent Bristol piston engines such as the Hercules 763. The last odd number, in fact, in this case indicates that a torque meter is fitted. B.O.A.C., among others, now specify the fitment of torquemeters, one reason being that a small loss of power on a four-engined aircraft can be detected, traced and at once attributed to an individual power unit.

The torquemeters are of the hydraulic cylinder and piston type. Oil pressure applied by the pistons, being proportional to the torque, is transmitted to a gauge, and airscrew shaft h.p. may be calculated from this reading and the r.p.m. For the Hercules two large pistons are fitted; the Centaurus has three, and on the Theseus eight small pistons support the annulus of the epicyclic reduction gear. An incidental advantage of this "floating mounting" is that it ensures that all the planet gears take an even share of the load.

Two Theseus Series TH.IIs are fitted in the Lincoln, and the present aim is to gain as



The isolation between bulkheads of the combustion chambers and turbines is revealed in this starboard view of the Theseus. The oil tank is mounted beside the compressor casing in the separate front bay.

THESEUS AIR TESTING

much experience as possible in the air. Details of the aircraft accessory gear box, to be mounted on the rear bulkhead, have still to be finalized, but provision is made for an extension shaft to be coupled to the rear end of the airscrew turbine shaft. On the Lincoln the piston engines still look after the aircraft services. This will be changed later, and the ultimate intention is that all four power units shall be of the Theseus type. As soon as a Theseus 21 (with heat exchanger) has been type tested, this unit will also be tested in flight; and, although the heat exchanger is less advanced in development than other components, it will be ready at least as soon as any airframe is ready to take it. The accessory drive shaft will in this case be able to pass through the hollow centre of the heat exchanger.

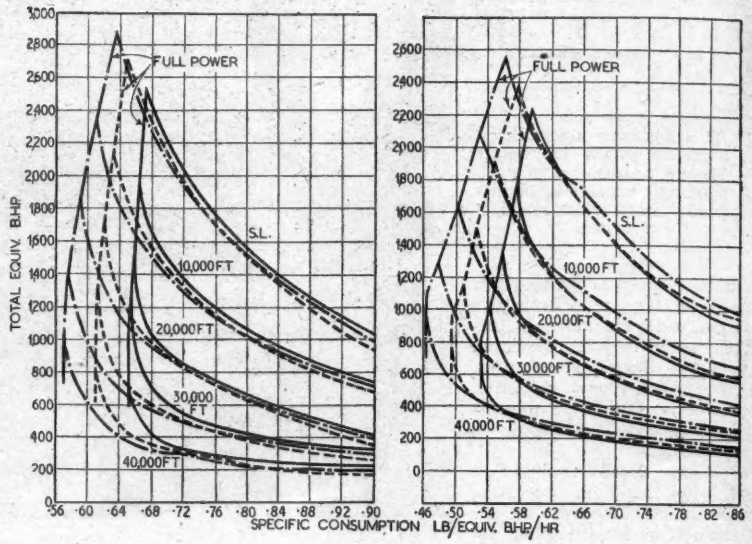
Vertical and horizontal drive shafts for the engine auxiliaries and for the electric starter respectively pass through the radially disposed vanes in the air intake casing behind the reduction gear. Bevel and spur gears transmit the drive from the compressor rotor shaft.

The fuel system is of the now-familiar type developed by Joseph Lucas Limited, and the pump, driven as already described, is mounted on the oil sump beneath the air intake casing. A single lever controls power on the fuel throttle valve, and the airscrew pitch is entirely automatic under normal conditions. The power control lever may, if desired, be arranged to control airscrew feathering and pitch reversal as well.

The "free" airscrew and turbine arrangement results in a greatly reduced load on the electric starter which has only to turn the compressor and its turbine.

As on all gas turbines, the starting procedure is simple and entails the initiation of an automatic sequence of actions by the use of a single switch in the cockpit.

Considering the company's many major commitments, Bristol engineers have done well with the proportion of manpower and money available to reach type-test stage within eighteen months of the Theseus first running.



A comparison of the fuel consumption curves for the Theseus series TH.11 (left) without heat exchanger, and the TH.21 (right) with heat exchanger. The solid, broken and dotted lines indicate speeds of 200, 300 and 400 m.p.h. respectively.

Turning to details of the Lincoln installation, after removal of the existing nacelle, the new nacelle structure with four pick-up points for the Theseus was attached to the existing brackets on the wing spars.

The four pressed-steel engine mounting beams are bolted to the compressor casing where it is flanged out for the centrifugal stage. These beams are attached to the forward end fittings of the symmetrical triangulated steel tubular mounting structure, which is itself standard engine equipment.

Nacelle Layout

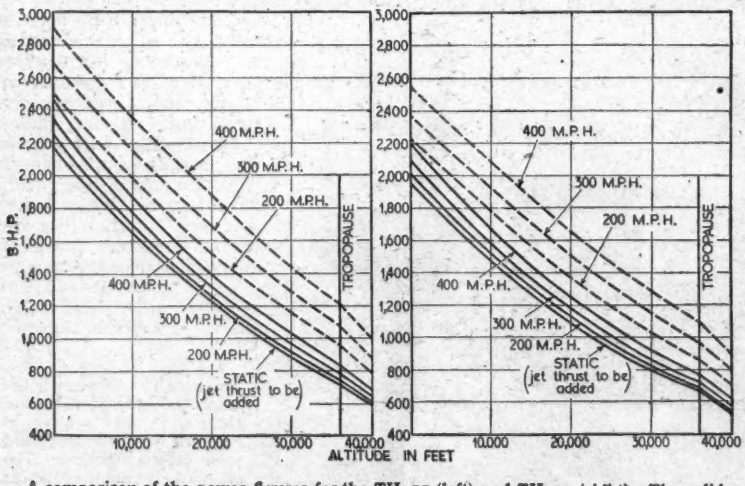
The power plant is divided into bays by two fireproof bulkheads, one at the mounting beams and one between the unit and rear nacelle structure. The high-temperature region—combustion chambers and turbines—is thus isolated, and the fuel pumps, oil pump, 15-gallon oil tank, oil cooler, etc., are placed forward of the front bulkhead.

Hinged panels with quick-release toggle fasteners give access to the engine, and the whole nacelle with centrally placed bullet spinner is obviously of excellent aerodynamic form.

The nacelle is underslung, but to clear the flap it was necessary to incline the jet pipe 15 deg. downwards. The orifice is provided with an adjustable flap to control its area. This can be under remote automatic control.

The Lincoln fuel system has been modified as would be expected. Of the three main wing tanks on each side, the two outboard are now used for kerosene, and No. 1 main inboard tank holds petrol. The total capacity is given as 2,850 gallons, of which 1,690 is devoted to kerosene. No balance line has been provided, so each Theseus has a separate fuel supply.

Below the mid-upper turret position (the turret has been removed) is found a large anti-shock-mounted panel of recording instruments, and an R.A.F. type camera, and there are two seats for flight observers. The port Theseus carries the majority of instruments, but basically the two are



A comparison of the power figures for the TH. 11 (left) and TH. 21 (right). The solid line is for airscrew power and the broken line for total equiv. b.h.p.

THESEUS AIR TESTING

interchangeable, port or starboard.

The cockpit has not needed to be altered appreciably, and several of the existing controls and switches have been used for the Theseus engines. To prevent confusion all Theseus controls such as throttles and feathering buttons have been painted yellow. The outer boost gauges of the original Lincoln are now burner-pressure gauges, and the outer r.p.m. indicators show the compressor speeds. Below these are the turbine rev. indicators, and between them, the jet pipe temperature gauges.

From the cockpit the Theseus airscrews look relatively lower and more forward than on the original Merlins, and there appears to be alarmingly little clearance between inboard and outboard blades. In fact, there must be several inches spanwise, and the outboard blades are perhaps six inches behind those of the inboard Merlins. The present D.H. four-blade Hydromatic airscrews on the Theseus units are 13ft in diameter and have more paddle-like blades than the Merlins. They rotate clockwise when viewed from in front, so with anti-cockwise Merlins inboard there should be a pleasant directional stability on take-off. It comes as a surprise that on pushing a Theseus airscrew blade literally with one finger, it revolves smoothly for as much as one rotation. On starting up, the unit lights up and the gas generator runs for some seconds before the airscrew starts to accelerate.

An incidental advantage of the free airscrew turbine is the low thrust produced by the airscrew on approach for landing, for a relatively high compressor turbine speed. It is hoped that as little as 25 to 30 h.p. will eventually be delivered at idling speed, and only about 500 h.p. is now given on the approach at 6,500 r.p.m. From this speed, on quick opening of the throttle, full power can be delivered in about 3½ seconds. Idling speed at present produces around 50 h.p. at the "prop" and, like all gas turbine power units, the Theseus power curve shows a much more rapid increase above about 50 per cent r.p.m. These low-power approach characteristics coupled with a rapid pick-up to full power will be very valuable for any naval aircraft application which may be in mind and will in the normal course of events aid in a good steep approach. On the pilot's speed indicators, compressor turbine and airscrew turbine r.p.m. needles move round the dials strictly according to their speed ratio almost as if geared together.

As may be seen from the heading picture and this side view, the complete Theseus outboard nacelle with bullet-shaped airscrew spinner, is, neat, compact and aerodynamically of excellent shape.

Over short distances the series TH.11 engines would be used in that the saving in total fuel would not be sufficient to justify the additional weight of a heat exchanger; for long ranges, however, the series TH.21 will be available with attendant reduction in fuel consumption. A comparison of power and consumption figures may be made from the accompanying curves.

LEADING PARTICULARS AND PRELIMINARY PERFORMANCE DATA

Reduction Gear Ratio	0.119 Airscrew Turbine Speed (L.H. Tractor)
Compression Ratio (Sea Level Static)	4.4 : 1
Compressor Speed	8,200 r.p.m.
Air Delivered by Compressor (S.L. Static) ...	30 lb/sec
Power Absorbed by Compressor (S.L. Static) ...	3,500 b.h.p.
Airscrew Turbine Speed	9,000 r.p.m.
Airscrew Speed	1,070 r.p.m.
Oil Max. power	3 pt/hr

	THESEUS SERIES TH. 11 (Without heat exchanger)	THESEUS SERIES TH. 21 (With heat exchanger)
Max. continuous power output and fuel consumptions		
S.L. Static	2,180 b.h.p. + 600 lb jet (0.80 lb/b.h.p./hr)	1,950 b.h.p. + 500 lb jet (0.70 lb/b.h.p./hr)
S.L., 300 m.p.h. ...	2,700 equiv. b.h.p. (0.65 lb/equiv. b.h.p./hr)	2,380 equiv. b.h.p. (0.57 lb/equiv.b.h.p./hr)
20,000ft 300 m.p.h	1,680 equiv. b.h.p. (0.62 lb/equiv. b.h.p./hr)	1,500 equiv. b.h.p. (0.53 lb/equiv. b.h.p./hr)
Weight, Net, Dry ...	1,860 lb	2,310 lb

Note.—Equivalent b.h.p.=Airscrew shaft h.p. + (jet h.p. + airscrew efficiency). Airscrew efficiency assumed 80 per cent.

AIR ESTIMATES

(*Continued from page 267*).

Reserve of Flying, with a nucleus of regular personnel, in which the A.T.A. would be given a chance to participate.

Mr. Noel-Baker said that W.A.A.F. recruiting was satisfactory, and that women would be an essential part of the R.A.F. in time to come. It was proposed, when circumstances permitted, to train and employ a very limited number of women, beginning as aircrew, for non-combatant duties in communication flights, anti-aircraft co-operation, etc. Consideration was also being given to the formation of a flying branch for women in the reserve, into which women who were already qualified pilots, including those in the A.T.A., could be entered.

Mr. Crawley asked the Secretary of State to consider the overlapping between Transport Command, civil airlines and, to some extent, the charter services.

Mr. Bowden commended to the Minister American fire-fighting equipment.

Mr. Harold MacMillan questioned the value of Tiger Moths, or "little machines which take their place," as training for Bomber Command or Fighter Command.

Mr. Geoffrey de Freitas, Under-Secretary of State for Air, gave an account of the progress in the Volunteer Reserve, A.A.F. and A.T.C. He quoted from the R.A.F. War Manual and held that the aircraft is still far from being obsolete, but that there was no exclusive reference to aircraft in the War Manual as means of carrying the bomb. We were getting more transport aircraft, he said. There was the Valetta, the military version of the Viking; the Hastings, a heavier transport; and the Shackleton, which was for long-range maritime operations.

Mr. Noel-Baker said that supposing he tried to tell the committee which squadrons were operational and which were not, he would be gravely embarrassed to give any figures which would stand up to close examination. Some squadrons were operational in the sense that they were on the station where they were supposed to be, that they were flying, and that they were fully efficient, but they were well below their proper numbers. Others were operational in the sense that they were up to numbers but had insufficient servicing manpower to achieve the desired flying hours.

MAINLINER: The Douglas DC-6, of which thirty-five have been ordered by United Air Lines, the American domestic operator. They are due to start scheduled operations next month.

CIVIL AVIATION NEWS

Theseus-powered Hermes : Mutual Insurance Scheme : U.S. Attacks Airport Bottlenecks

MORE ABOUT THE TUDORS

LORD NATHAN, Minister of Civil Aviation, informed the House of Lords last week that it was too early yet to determine how long it would take for modifications to be completed on the Tudor I to bring it up to the standard required by B.O.A.C. The Corporation, it will be remembered, did not consider their first aircraft to be satisfactory for service on their routes. He also said that the prototype being fitted with Rolls-Royce Nene jet engines would be known as the Tudor VIII. Of the original order for twenty-two production aircraft, sixteen would be completed as Tudor Is for B.O.A.C., eight of which had already been test flown. Two others were on order for the M.C.A. for special communications duties, and they would be equipped to a different standard and known as Tudor IIIs. The Mark IV, which had been developed from the Mark I to meet B.S.A.A. requirements, would have a longer fuselage and carry thirty-two passengers.

Lord Nathan said that production was proceeding, but amendments to the original programme had been necessary owing to difficulties in technical design and the further delay which had been caused by recent fuel restrictions, during which time the factory had been closed for nearly a month. He hoped that the first Tudor IV would fly at the end of this month.

Practical information regarding the performance of the Tudor II with Bristol Hercules engines (Tudor VII) is eagerly awaited, although there has been no indication that Hercules engines would be fitted as standard even if performance and handling are improved.

The Hercules 120s which were supplied some months ago for trial installation in the Tudor are not the most suitable units available, being a civil version of the 100 as installed in the Halifax VI. Their particular characteristic is maintenance of good w.m. cruising power up to high altitude. The later Hercules 763, which will give 2,200 h.p. for take-off even at Nairobi altitude, would be more suitable.

An interesting feature of Bristol power ratings is that most units are tested and approved on the test beds at 1 lb boost above the rated figure quoted in order that the full power output claimed shall be delivered in the aircraft with exhaust system fitted.

It has been suggested that apart from the improved take-off due to increased take-off power, the swing tendency of the Tudors might be improved, due to the effect on slipstream of a symmetrical thrust line and clockwise (from the front) rotation of the airscrew. By symmetrical thrust line is meant an airscrew mounted in the centre of the circular section engine cowling and nacelle.

THIRD-PARTY INSURANCE

ONE of the leading Protection and Indemnity Shipping Associations has drawn up a scheme for third-party mutual insurance for the aircraft industry. Such a scheme has existed for many years in the shipping industry, and it has been the opinion of some that a similar arrangement was necessary for aircraft owners.

Towards the end of 1944 the leading aircraft users in this country and abroad were circulated for support, and rules have since been drawn up for the proposed Aviation Protection and Indemnity Association, Ltd. Membership is open to carriers, aircraft owners and operators wishing to insure against third-party risks, and the business of the Association will be conducted by a committee of members elected by members themselves. The committee will be assisted by the managers of the Association.

As in the case of similar associations for shipowners, it will be the endeavour of the Association to be of service to the aircraft owner to relieve him as far as possible of trouble and anxiety in connection with claims either made or threatened against him by third parties. The funds from which claims will be met will be raised by contribution from members on a strictly mutual basis in proportion to the aircraft entered, based upon weight, computed, probably, as payload plus fuel.

The risks to be covered as defined in the rules of the Association embrace the whole field of third-party liability.

AIRCREW VISAS

ATTENTION has been drawn in the House of Commons by G/C. Wilcock to the expense and delay caused by the necessity of obtaining visas for aircrew members flying through Europe and Africa. He asked that arrangements might be made for the regular crews of aircraft to be granted, perhaps, a six months' visa, as in the case of Sweden. A written answer referred to the P.I.C.A.O. recommendation for a standard ruling that no visas should be required on any general declaration or any passenger or cargo manifest of any airline. It was pointed out that the U.K., as a member of P.I.C.A.O., had applied such recommendations to grant aircrew of foreign airlines arriving in this country, with the exception of Russia, a temporary discharge which allowed them freedom to leave the airport and move about the country without restriction, for a limited time. It does not apply to charter or private companies. A list of countries was issued showing that for many of them a visa was not required for British aircrew on regular services. Progress is, however, being made in the general abolition of visas for European countries. It is rather interesting to note the observation made by Mr. J. W. Booth, chairman of British South American Airways, in a recent lecture, that ships' crews are issued with a discharge book which grants freedom of entry to any port but they are not required to carry either passport or visa.

AWAITING THE SOLENTS

THE last "C" Class flying-boat, *Caledonia*, to operate on the B.O.A.C. South African service has arrived back in this country This marks the end of operations for the class after a magnificent record. The South African flying-boat service was opened in May, 1937, with these boats, and the route down the Nile and along the coast knocked one and a half days off the land plane route which had up to that time been operated When Italy came into the war in 1940 the sixteen

boats which were east and south of Italy were unable to return to the U.K., and flew on the horse-shoe route from Durban via Cairo to Australia. When Japan came into the war the flying-boats were unable to go farther east than Karachi. The *Caledonia*, in June, 1937, flew the Atlantic in the westerly direction on an experimental meteorological flight, and that was, in fact, the first time a British-built flying-boat had made the crossing. Before this flight, and to serve as an Atlantic trial, *Caledonia* flew non-stop to Egypt from the U.K., the first time such a flight had been made. It was the second "C" class aircraft to be built.

The flying-boat service to South Africa is now curtailed until the Solents are put into operation, which should be in the autumn, and the route will then be through the Lakes to Vaaldam.

ROUND-TRIP FARES

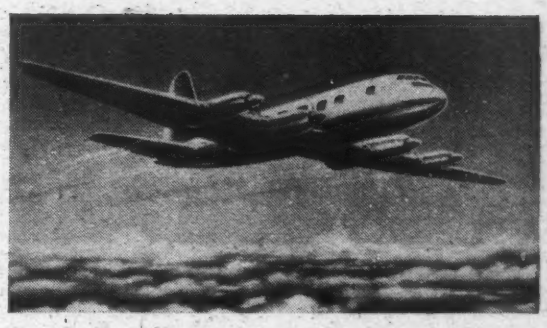
PAN AMERICAN WORLD AIRWAYS have made available special rates for transatlantic fares. This has been made possible by a new agreement with the Civil Aeronautics Board. The regulations allow round-trip discounts on all Pan American portions of transatlantic routes regardless of the point of departure or arrival in the Western Hemisphere, Europe, Africa or Asia. It is not even necessary for both crossings of the Atlantic to be made on Pan American aircraft, although both crossings of the Atlantic must be made by air and one of them north of the Tropic of Cancer.

Tickets for the round trip must naturally be purchased before departure. It is thus possible to originate a trip in Latin America and travel via either Miami or San Juan across the Atlantic and still get round-trip savings. Such trips are referred to as "double open-jaw" tours and mean an approximate saving of 10 per cent.

THE HERMES Mk. V

PROGRESS with the Theseus, the 2,400 equiv. b.h.p. Bristol airscrew turbine, is sufficiently advanced to justify a forecast that the Hermes Mk. V prototype will fly early in 1948. The Mk. V with an a.u.w. of 84,000 lb, differs from the earlier Mk. IV only in the type of engine, for both have a tricycle undercarriage, are pressurized and air-conditioned. The fuselage, which is free from structural bulkheads, provides accommodation for sixty-three passengers on the short-range type. Naturally the internal design is subject to the requirements of different airline operators, but other standard models are for fifty-two passengers and a special model for forty passengers or less. A lounge and bar, and two ladies' rooms complete the amenities in this promising transport.

The engine nacelle line on the Mark V may be improved by the use of smaller bulkheads, at least in the outboard positions. On the existing non-tricycle Hermes, the lines are already very clean and good, but are rather marred by the bump in front of the bulkhead which is a hangover from an early Hastings project. This would have provided for a mark of high-altitude Hercules with exhaust turbo-supercharger and its accessories contained in a plenum chamber behind the engine. A cylindrical cowling for the Theseus would have some desirable characteristics, but it is probable that a symmetrical slightly tapered nacelle will be adopted.

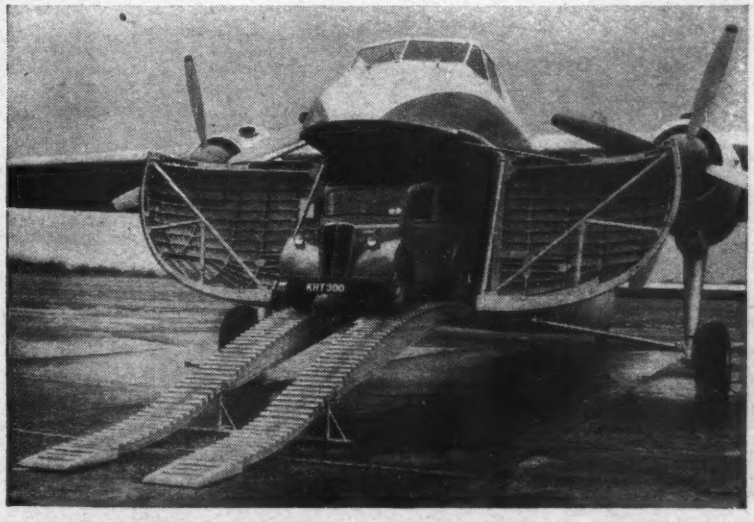


An artist's impression of the Hermes V. The windows appear to differ from those in drawings of the Mark IV and seem unusually large for a pressurized cabin.

The Mk. V. is expected to have a cruising speed of 343 m.p.h. and a maximum range of 3,070 miles. The payload for a 2,000-mile range will be 14,200 lb and the maximum payload will be 17,100 lb. The estimated cost of operation for a range of 1,660 still-air miles has been given as 9d per ton/mile but some experience of over-optimistic long-distance forecasts leads us to think that if cost of a little under twice this figure can be attained, it will be quite creditable.

TWO A.R.B. NOTICES

THE Air Registration Board have issued two *Notices to Licensed Aircraft Engineers and to Owners of Civil Aircraft*. *Notice No.* 14 has been issued as a result of a recent accident, and it has been found necessary to draw attention to the dangers of the adherence of hoar frost, snow or ice to aerofoil surfaces, and to stress the importance of their removal immediately before take-off. This is an important *Notice* and should receive the immediate attention of all owners. *Notice No.* 15, also issued as a result of accidents, is to reintroduce precautionary measures which were relaxed during the last war. It concerns the locking of A.G.S. and similar types of pipe couplings with wire, and states that no recommendations will be made for the issue or renewals of Cs. of A. for aircraft not complying with certain standards.



FOR THE PIPELINE. Planned in conjunction with Airwork, the next Bristol Freighter tour is to Kuwait, Abadan and Haifa for demonstration to oil companies. The ramp has been specially designed, and a hand-operated winch is installed inside the aircraft.

AWAY WITH RED TAPE

THE United States would appear to be taking the lead in efforts to break Customs and immigration bottlenecks at airports. A survey team representing all American agencies concerned with border regulations is making a tour of twenty-one airports along the country's frontiers to consult local agents, airline and airport staffs. Recommendations are being made to simplify procedures, eliminate red tape and reduce the questions to and the examination of passengers.

The tour will not be finished until the spring, but it is already expected by I.A.T.A. that there will be an immediate effect at airports in the time taken for clearing Customs and in the handling of passengers when the recommendations are adopted. It is hoped to put an end to the humiliation of passengers, and to the many documents which are considered to be not absolutely necessary. A reduction in the paper work and the returns at present required from the airlines would save an enormous amount of money as well as time.

P.I.C.A.O. standards have been accepted by the survey as a basis on which to make recommendations. There is naturally no wish to relax health and

CIVIL AVIATION NEWS

quarantine regulations, and it is intended to continue to search thoroughly the qualifications of those travellers entering America and who wish to stay permanently. Already at La Guardia the recommendations have been made known and include the establishment of a Customs-free airport and a reduction in documentary formalities. An increase in the number of Customs inspectors at night, on Sundays and during rush hours, based upon the volume of business, is also recommended. Other suggestions make for the provision of a single airline bond to cover all geographical areas and all manner of air transport liabilities. This would eliminate hardship in establishing credit at emergency or non-scheduled landing places.

The Government, in the opinion of the team, should pay for the cost of the upkeep of Customs offices which at the moment are paid for by airline operators. A revision in passport, visa and health card documents is recommended in order to provide greater mobility and less inconvenience and delay. Wider discretionary powers to inspectors are proposed, to allow parole for aliens awaiting hearings before Boards of Enquiry, so avoiding detention, whenever that would be reasonably possible. For aliens leaving the country after a temporary stay, a simplified income tax clearance involving only the signing of a simple form has been recommended.

For the benefit of airline operators a card file of all alien crews regularly using the airport has been designed to eliminate the preparation of inbound and outbound crew manifests. In the case of airports on the northern boundary, a joint committee of United States and Canadian officials has been organized to cover the whole of the 3,000-mile border.

BREVITIES

In a written answer to a question in the House, the Parliamentary Secretary gave figures showing the comparative traffic returns of passengers, mail and freight on the North Atlantic route for the past twelve months. The greatest number of passengers came into the United Kingdom in June, when the figure was 3,032. This shows up the figure for January this year, which was 1,136. A total of 3,212 left the U.K. in September, the highest period, and in January it had fallen to 2,722. The lowest month was April last year, with 1,785. Figures for freight and mail during January were about average into and out of the U.K.

* * *

British European Airways have replaced Avro XIXs on the London-Belfast service with Jupiters. These are, of course, Ju.52 aircraft and carry twelve passengers. The Corporation are running special Easter services on internal routes in the U.K. from March 31st to April 12th.

* * *

The Russian-Rumanian airline, T.A.R.S., has started operations on the internal routes and is understood to be negotiating with Czechoslovakia for permission to fly services from Bucharest to Prague.

* * *

Another new company, North Norway Polar Aircraft Air Lines, Ltd., is hoping to start operations in April. Four six-seater aircraft are ready to operate on floats among the islands north of latitude 66 deg. N. It is understood, however, that approval has not yet been given by the Norwegian M.C.A.

DOUBLE CENTURY: Capt. L. Messenger who has completed two hundred crossings of the Atlantic. Since 1941, he has been flying the North Atlantic, first of all on the return ferry service and since July last year on the B.O.A.C. passenger service between the U.K. and New York.

A new air terminal building is under construction in St. Peter's Square, Manchester, on a site cleared by enemy action. There will be ample room for a coach park and the main airlines will be allowed office accommodation in the building.

* * *

Airwork are expecting early delivery of six Vikings of the latest long-nose type, equipped for carrying passengers. They will go into service in the company's new charter department which is being organized by Sir Archibald Hope.

* * *

K.L.M. will continue their transatlantic service through the Azores in the west-bound direction but are now flying the old route through Gander and Prestwick on east-bound flights. Full summer schedules using the North Atlantic route are expected to come into force during next month.

* * *

A Certificate of Airworthiness has been granted by the C.A.A. for the Constellation to operate at a take-off weight of 102,000 lb. The previous Certificate approved an operating weight of 90,000 lb.

* * *

Australian commercial pilot licences at the end of 1946 numbered 1,117. This shows a considerable increase on the 1939 figure of 376. Increases were also evident in other aircrew categories. "A" licences, however, which, in 1939 numbered 1,123, were down to 453 at the end of last year.

* * *

Mr. George Goodhew, late of Universal Flying Services, has formed his own company, Goodhew Aviation, Ltd., to manage and operate the Oxford airport at Kidlington. In addition, the company will be responsible for running the Oxford Aeroplane Club, better known as the Oxford Flying Club, and will also carry on overhaul and repair work for all types of civil aircraft.

* * *

Scottish Aviation have accepted the overhaul of six Dakota transport aircraft for the Belgian Air Force. The company have on hand thirty Dakotas for conversion to passenger aircraft for operators in India, Ethiopia, Iceland, and for Swissair, T.W.A. and B.E.A.

* * *

The Sabena service from Belgium to the Belgian Congo is to be increased to five services a week as from April 15th. The Brussels-New York service is to be reopened on June 1st at a weekly frequency, and it is hoped to make it bi-weekly as from about July 1st. A new route from Brussels to Cairo is expected to start operations in the middle of June. This service will be run twice a week.

* * *

British European Airways hope to recommence operations with six Vikings on passenger services to and from Prague, Oslo, Copenhagen, Stockholm, Madrid and Gibraltar on April 21st. The route from London to Geneva will be the first new route to be opened, and there will probably be an extension of Viking services towards the end of May.

* * *

American Overseas Airlines have started three services a week through Keflavik, in Iceland, known during the war as Meeks Field. Two of the schedules are from New York and Gander, through Keflavik to Copenhagen and Stockholm, and the third, from New York, Gander and Keflavik goes through Oslo to Stockholm. The time taken through Copenhagen is twenty-three hours, and through Oslo twenty hours.

* * *

The first meeting of I.C.A.O., the permanent organization, will be held on May 6th in Montreal.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THE BATTLE OF BRITAIN
Conflicting Casualty Figures

I HAVE read that it is intended to place in Westminster Abbey a Roll of Honour containing the names of 1,500 pilots of Fighter Command who died in combat between July 10th and October 31st, 1940. The Stationery Office booklet "The Battle of Britain," published in April, 1941, quotes casualties at 375.

Could any of your readers comment on these apparently dissimilar figures? F. J. SEWARD.

AIR ACCIDENTS
The Question of Comparisons

IN view of the number of aircraft accidents in recent weeks and of the correspondence on the subject that has ensued in your columns, may I be permitted a little of your valuable space in which to express a few thoughts and suggestions upon one aspect that does not seem to have received the serious consideration which it appears to deserve?

Surely it would be in the interests of all those in aviation to see that some sort of temporary board is set up "forthwith" to investigate from every conceivable angle all the available facts and figures of accidents to all forms of land, sea and air transport, and thence by careful computation and unbiased discussion eventually arrive at some true criterion of accident risks by which all those forms of transport can be compared in true perspective?

I think a word or two here would not be out of place concerning the so-called "bogy" of passenger-mileage fatality rates about which a number of dogmatic statements have been made. The truth, as so often happens, appears to lie somewhere between the extremes so often stated, i.e., the very fact that practically no risk of accident prevails between the actual operations of taking-off and landing is surely one of the great arguments in favour of flying? The same cannot be said of ships and trains over great distances where accident risk is directly proportional to the distance travelled.

May I end, therefore, in hoping that the day will dawn when the Press and thence the public will eventually get into perspective the 500 deaths and 17,000 injured a month on the roads of little England alone, as compared with the few sensational air crashes that occasionally occur anywhere from Hong Kong to Timbuctoo and which, of course, never fail to scream their way across the front page headlines, while road deaths occur with such monotonous regularity that they don't even make good enough news for the bottom right-hand corner of the last page! If the Press must give such prominence to air crashes, I revel to think of the result if they could be made to treat likewise road accidents for the whole world. That would shake 'em. Just imagine the headline: With acknowledgments to Titanines: "Wouldn't it look grand?"

D. S. F. WINSLAND.

THE PRIVATE FLYER
Suggested Regulation Criticized

THE imposition of new regulations upon the private flyer seems destined to be one of the proverbial last straws. They are made presumably in the interests of added safety, but they will add very little to safety. They seem generally to be welcomed by professional pilots, but even the excuse for the imposition of these regulations is based on a fallacy.

A private flyer does not make a habit of wandering aimlessly around busy airports in low visibility to the danger of pilots doing a G.C.A. He is just as concerned about his chances of survival as any one else and generally speaking just as considerate for the rights of other air traffic as any professional pilot, and considerably more so than some. I cannot, in many years of club flying, recollect a single case of collision between a private aircraft and an airliner. This is agreed by our club president, who is a G.A.P.A.N. examiner and a "B" licence pilot of twenty years' standing, so that it does not seem that private pilots have been much of a menace to airline traffic.

The suggested number of hours before obtaining an "A" licence makes the cost almost ridiculously expensive. Restrictions over visibility in a climate such as this with frequent purely local deteriorations will often give rise to the situation where one sits idly on an airport covered with industrial haze of the most innocuous kind and unable to proceed into perfect flying weather a few miles away, or conversely unable to return home from perfect conditions into slight haze. A few doses of this would convince the most enthusiastic pilot that it is quicker by bicycle and that his enthusiasm is misplaced.

Again, the suggested use of radio seems to have been made by someone completely out of touch with realities. Radio has always been too weighty for light aircraft and is now extremely expensive and probably almost unobtainable. And the club pilot has very little use for instruments except for an occasional ascent or descent through cloud or a trip over water on a hazy day.

The remedy seems to me fairly simple. If and when the Ministry succeed in buying and maintaining in service enough airliners to cause frequent traffic at any of their (or our) expensive airports, let them completely prohibit all flying within a certain safe and clearly specified airspace except under their radio control. The penalty could be suspension of licence except under conditions of dire emergency which could be upheld on the spot. Any breaches of safety in the approach lanes to his airport can always be dealt with by an efficient controller by the use of pyrotechnics and/or the King's English.

We get enough half-baked and useless regulations forced down our throats in this year of "planned" grace, and I submit that these suggestions are not in the interests of public safety or of flying, and should be most vigorously opposed by the clubs and light aircraft manufacturers concerned. If the Ministry wish to drive private flying from the skies, and make us all travel tamely in their giant airliners (which at present they seem singularly incapable of providing and organizing to the satisfaction of the travelling public), then by all means let us have a flood of regulations of this sort. The end will be inevitable and not too long delayed, and the club and the aircraft industry will have reaped the benefit of a bit of singularly useless and misplaced bureaucracy.

I cannot close this letter without making the point that if the Air Ministry, basking in their usual peacetime complacency, could be made to realize that the wartime flying potential of a nation does not by any means consist of combat pilots, the clubs would be getting far more richly deserved encouragement than they are at present.

The tremendous and invaluable service done this nation by some hundreds of young and middle-aged men, all produced by the clubs, who went on to operations, instructional flying and the ferrying which among other things materially helped to win the Battle of Britain, has not been very graciously acknowledged and has been all too quickly forgotten. This potential may not be there next time, thanks to a singularly ostrich-like and unintelligent attitude. D. K. N. EVANS.

FORTHCOMING EVENTS

Mar. 27th.—R.Ae.S.—Birmingham: "Historical Survey of the Aeroplane." Lord Brabazon of Tara, 7 p.m., Queen's College, Paradise Street.
Mar. 27th.—Royal Aeronautical Soc.: "The War in the Ether," Air Vice-Marshal E. B. Addison, C.B., C.B.E.
Mar. 28th.—London Transport (Central Buses) Flying Club. Dinner and Dance, Bridge House Hotel, London Bridge.
Mar. 29th.—Radio Controlled Models Soc.: Lecture and Demonstration, P. Hunt, Y.M.C.A., Peter St., Manchester.
Mar. 30th.—Nîmes Aero Club Rally, Nîmes, France.
April 7th.—Fair Oaks and Oxford Flying Clubs. Joint flying meeting, Kidlington airfield.
April 7th.—United Services Flying Club. Flying meeting Elstree airfield.
April 9th.—R.Ae.S.—Southampton: An address by E. F. Relf, C.B.E., F.R.S., F.R.Ae.S.
April 10th.—Royal Aeronautical Soc. "A Review of Production Difficulties in Relation to Aircraft Design." C. E. Fielding.
April 12th.—British Interplanetary Society: "Cosmic Rays," Lionel Gilbert, A.R.C.S., B.Sc., Science Museum, South Kensington.
April 15th.—R.Ae.S.—Bristol. Annual General Meeting.
April 17th.—Royal Aeronautical Soc. "Testing Civil Aircraft" P. A. Hufton, M.Sc.
April 18 to 21st.—Aero Club of Spain. Madrid Air Rally.
April 24th.—Royal Aeronautical Soc.: "The Risk of Fire, and Fire Prevention Methods," Dr. J. W. Drinkwater, B.Sc., D. Phil., and W. G. Glendening.
May 1st.—Royal Aeronautical Soc.: "The Development of the A.S. Type Gas Turbine," W. H. Lindsey, M.A., A.F.R.Ae.S.
May 2nd.—R.Ae.S. Graduates and Students. "Flight Testing of Aircraft," W. Humble.

Royal Air Force and Naval Aviation News and Announcements

VALETTA: In the debate on the Air Estimates last week, Mr. de Freitas disclosed that the name Valetta has been allocated to the R.A.F. version of the Viking, seen here at the S.B.A.C. Display last year. A pre-war Short bore the same name.

"Flight" photograph.

SERVICE AVIATION

Demonstrations for Soviet Deputies

A VISIT to Halton by the delegation of Supreme Soviet Deputies, now visiting this country, has been arranged for to-day (Thursday). The Deputies will inspect the station and see flying demonstrations by aircraft of Bomber, Coastal, Fighter and Flying Training Commands. The Secretary of State for Air will be present.

Silver Jubilee

WITH Air Chief Marshal Sir Philip Joubert as their guest of honour, the Old Comrades' Association of the R.N. Seaplane Base, Port Said, celebrated their silver jubilee in London last Saturday.

The base was established in January, 1916. Borne in small seaplane carriers —*Ben-my-Chree, Empress, Raven, Anne* and *City of Oxford*—its aircraft operated against the Turks from Asia Minor to Aden. In 1918 the seaplanes were replaced by bombers, the unit then being redesignated No. 269 Squadron. Disbanded in November, 1919, "269" was re-formed in December, 1936. From 1937-8 it was commanded by A. Cdre. N. S. Allinson, C.B..

In view of speculation concerning the illustrious name *Ben-my-Chree*, we sought first-hand information at the silver jubilee gathering and were assured that it means "Mother, my dear."

Appointment

THE Air Ministry announces the following R.A.F. appointment:—

A. Cdre. Frank Noel Trinder, C.B.E., to be Senior Air Staff Officer, Headquarters, Maintenance Command, with the acting rank of A.V-M.

A.V-M. Trinder has been on equipment duties with the Air Division, Control Commission, Germany (British Element) since September, 1945, and was formerly at the Headquarters of the 2nd Tactical Air Force for equipment disposal duties in connection with the disarmament of the German Air Force, from April of the same year. Previously he had been for seven months on equipment duties with the R.A.F. Element of the Combined Air Disarmament Headquarters and from November, 1943, until September, 1944, he was on administrative planning duties at the headquarters of the Allied Expeditionary Air Force. For two years before this he had been in America with the Royal Air Force Delegation at Washington, going there on equipment staff duties after a year in the Directorate-General of Equipment at the Air Ministry. At the outbreak of the war he was at R.A.F. Headquarters, Far East.

Born on December 24th, 1895, at Wareham, Dorset, he enlisted in the Army in September, 1914.

A Sunderland "Record"

A SHORT SUNDERLAND of No. 88 Squadron—"F" for Freddie—carrying a full load of mail, V.I.P.s and priority freight, lately broke the time record from Hong Kong to Iwakuni, Headquarters of the British Commonwealth Air Group in Japan, by covering twelve hundred miles in six hours forty minutes. The journey usually averages eight or nine hours. Piloted by W/O. Rhodes the Sunderland averaged 210 m.p.h. and beat the squadron's previous record for the journey by more than 15 minutes.

Dakota Accident

THE Air Ministry regret to announce that when a Dakota of R.A.F. Mediterranean and Middle East Command crashed on the Island of Ischia on March 8th, 1947, the following fatal casualties occurred.

Passengers

Mrs. C. Pay, Master Pay, Mr. T. S. Gill, Mr. Charmalhilli (Iranian), Lt. Col. G. Miles (retd.) Army, Acting (Electrical) Lt. Cdr. L. E. Scotchbrook, R.N.V.R., Pte. Dilley, Pte. Malone, Army.

Crew

F/L F. T. Bruce, R.A.F., F/S. D. Paton, R.A.F., F/S. F. G. Lewis, R.A.F., F/S. R. C. A. Bawler, R.A.F., Sgt. E. W. Rowe, R.A.F.

The next of kin have been informed.

Fitters (Atomic)

AT their passing-out parade at Halton last Wednesday, aircraft apprentices were addressed by Lord Portal of Hungerford, Controller of Production, Atomic Energy, in the following terms: "Some of you may be anxious about the future of the R.A.F. and think that these new methods of warfare —the atomic bomb and rocket—will make the Air Force out of date. I am not a prophet, but I will tell you this—that I do not think you will be worried by having to look after atomic engines in aircraft during your career. "Perhaps if you marry later in life and your sons join the R.A.F. they may come along to you when you are very old men and explain how simple your job was, looking after a Meteor or a Vampire, compared with their job of running an atomic hyper-supersonic all-purposes helicopter."

It was no exaggeration, he claimed, to say that because of what it did in the war the R.A.F. was more admired and respected abroad than any other British institution.

Lord Portal took the salute of the 212 passing-out apprentices. Nine cadetships were gained by the 48th entry.

"501" Fly Past

SPITFIRE pilots of No. 501 (County of Gloucester) Squadron, A.A.F., will fly over the grounds of Barnwell Manor, Peterborough, residence of the Duke of Gloucester, at 11 a.m. next Monday. The Duke is Honorary Air Commodore of the Squadron, for which recruiting is progressing steadily. In 1940, "501" was the last squadron to leave France. During the Battle of Britain it accounted for 119 enemy aircraft and later in the war destroyed 100 flying bombs—all at night.

Pagham Plan Dropped

BOGNOR Council has been told that the Air Ministry has abandoned its proposals to use Pagham Harbour, Bognor Regis, as a bombing range.

A Welcome Trio

THREE new types of aircraft—the Valetta, Hastings and Shackleton—were referred to by Mr. Geoffrey de Freitas, Under-Secretary for Air, during the debate on the Air Estimates.

The Handley-Page Hastings C. Mark I is already familiar to readers as a 75,000-pound transport fitted with four Bristol Hercules engines and having a top speed of about 350 m.p.h. at 22,000 feet. Forerunner of the civil Hermes, it is among the finest machines of its class and a very great advance over any British transport hitherto used by the R.A.F.

The Valetta, the prototype of which appeared at the S.B.A.C. Display last year, is a military development of the Viking and as such is an eminently useful type of moderate capacity.

Beyond Mr. de Freitas' statement that it is a long-range "maritime" aircraft nothing has been officially divulged concerning the Shackleton. It is reasonable to assume, however, that it will be a development of the Avro Lincoln bomber, incorporating Coastal Command requirements such as special armament installations, and possibly having more powerful engines. The Rolls-Royce Griffon and Bristol Theseus immediately suggest themselves as power plants for a heavy aircraft, in the design of which fuel economy is a primary consideration. A trial installation of two Theseus in a Lincoln airframe is described on pages 270-273 of this issue.

Historians Need Help

THE Air Ministry appeals to all who served with, or were attached to, the R.A.F. during hostilities, to send to the Air Historical Branch, Air Ministry, Whitehall, details of any action or event personally experienced or witnessed which strongly impressed them as typical of the spirit of the Service, or the conditions and atmosphere in which operations were conducted. As it will be some years before the full official history of the war is published, the appeal is made to assist in the preparation of a preliminary history of the war in the air covering the 1939-1945 period, to be written under the joint authorship of Denis Richards and Hilary St. George Saunders. The aim is to produce a work which will combine accuracy and impartiality with wide appeal.

Consideration will be given to all incidents reported, wherever they took place—whether illustrating conditions and operations in or over Europe, the Western Desert, the Burmese jungle, or the high seas. The comparatively unimportant incident, if sufficiently colourful, may be as valuable as the account of a major operation. All information submitted should be as circumstantial and carefully authenticated as possible in order that it may be compared with official records. By this means, the R.A.F. hope to fix for posterity a faithful picture of their great national wartime effort in the air.

Prize Cadet

AIR CHIEF MARSHAL SIR ARTHUR BARRATT'S sword, to which reference was made last week, was presented to Officer Cadet G. Henderson, prize cadet at the R.A.F. Regiment Depot, Catterick.

Belgian Defence Minister Here

THE Belgian Minister of National Defence, Colonel Defraiteur, has been visiting this country at the joint invitation of the Army Council and Air Council. He visited H.Q. Fighter Command, in the organization of which he had expressed particular interest.

Far East Combat School

FORMED to train officers and N.C.O.s of the Command in ground defence of their units and stations, the Far East Air Command Combat School was opened at Kuala Lumpur recently by A.V-M. J. D. Breakey, C.B., D.F.C., Air Officer Commanding, Air Headquarters, Malaya. The training courses will last three weeks, and pupils will be instructed in leadership, infantry tactics and the use of small arms under combat conditions.

Gunner Instructors in R.A.F. Regiment

THE Air Council has decided, as a temporary measure, to recruit experienced non-commissioned officers who have served in the Army or the Royal Marines for enlistment into the Royal Air Force under the Bounty Scheme as gunner instructors, Group B, in the R.A.F. Regiment.

Antarctic Lincoln

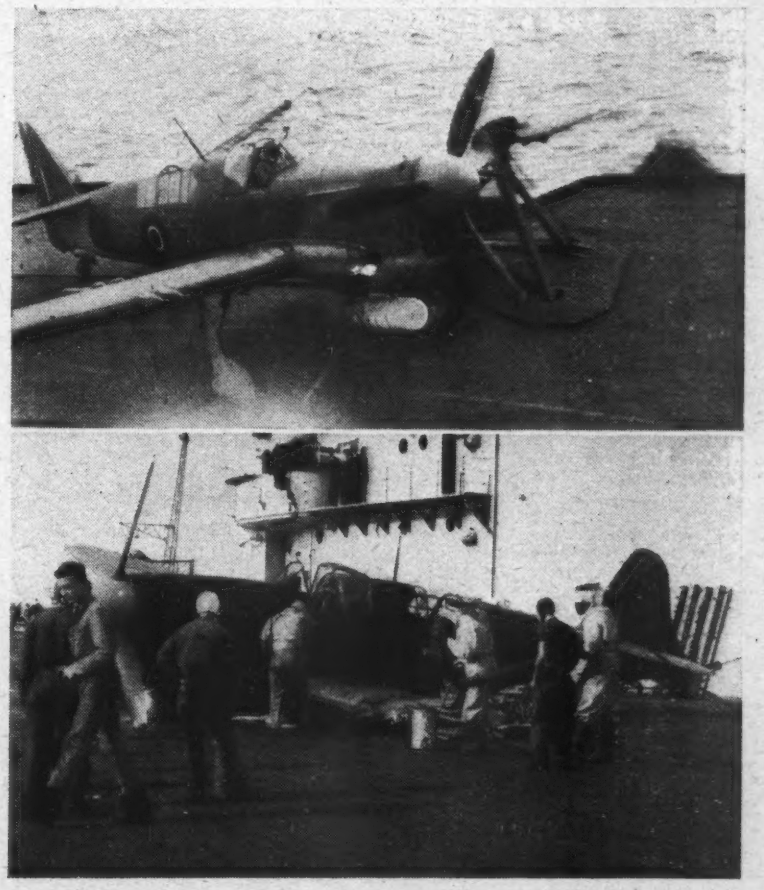
AN Australian-built Avro Lincoln bomber completed a 2,800-mile survey flight to Macquarie Island last Saturday week. This island will be the base of the Australian Antarctic Expedition planned for later this year.

A point of interest is that the Lincoln has a 2,800-mile range with full bomb load.

Swiss Hospitality

BEHIND the announcement that the dance section of the R.A.F. Central Band left on March 12th for Switzerland to play in Basle lies a story of Swiss hospitality to a number of badly burned R.A.F. airmen undergoing treatment in plastic surgery at the Queen Victoria Hospital, who were invited to Switzerland last year for convalescence before undergoing further operations.

A number of Swiss people subscribed money for the fares and the rental of a villa, and the holiday so toned the men up that on their return their plastic operations were 100 per cent successful. Gratified, the Swiss decided to provide accommodation for more men—possibly 200—from the Army and Navy as well as the R.A.F. A programme of social events was arranged to raise funds and the R.A.F. band was invited to play.



ATTACKING A GUN POSITION: An incident recently witnessed aboard H.M.S. *Illustrious* during her training cruise off the South Coast. The pupil-pilot of the Firefly has allowed his machine to slew into a port gun mounting. In the lower view the fire-fighters stand by.

SERVICE AVIATION

84 Group Crest

THE crest of 84 Group was presented to the personnel of the Group Headquarters by Air Marshal Sir Philip Wigglesworth, K.B.E., C.B., D.S.O., Air Officer Commanding in Chief, B.A.F.O. at Celle, Germany, on December 3rd, 1946. Copies are now available, free of charge to officers and men of No. 84 Group past and present who served with the Group for a period of 12 months between June, 1943, to May, 1945. Application should be made to the Senior Welfare Officer, No. 84 Group, R.A.F., B.A.O.R.

Air O.P. Officers' Association

AN Air O.P. Officers' Association has been formed, with the recognition of the Royal Artillery Association and the Royal Air Force Association.

Its purpose is to maintain the ties of friendship between officers, past and present, of both Services, who have served together in Air O.P. Units. In addition, an Historical Section has been formed to maintain records, and look after trophies of Air O.P. Units. This section has been charged with the task of producing an overall history of the Air O.P. from its inception to the end of the late war.

Any past members of Air O.P. Units, whether Royal Artillery or Royal Air Force officers, who have not received personal notification of the formation of the Association, and who are interested in becoming members, should apply to The Hon. Secretary, The Air O.P. Officers' Association, R.A.F. Station, Andover, Hants.

Reunions

A MEETING of about twenty officer ex-P.o.W.s in Europe was lately arranged at the R.A.F. Club by A. Cdre. H. M. Massey, D.S.O., M.C., and G/C. H. M. A. Day, D.S.O., O.B.E. As a result it is proposed to arrange a reunion in London for R.A.F. officers who were prisoners in Europe during the last war and to include officers of other Services who were confined in recognized R.A.F. Prisoners' Camps in Germany and Italy. Those interested should write to the Hon. Sec., R.A.F. P.o.W. Reunion, Room 109, N.E. Wing, Bush House, W.C.1, enclosing a shilling towards initial expenses.

* * *

It is proposed to hold a 224 Group Officers' reunion dinner in London about the end of April. Will all interested officers who served in Headquarters Staff, wings, squadrons and A.L.O.s communicate immediately with S/L. J. W. Chance, 16, St. George's Square, London, S.W.1.

Permanent Commissions

THE following officers have been selected for permanent commissions in the R.A.F.:—

GENERAL DUTIES BRANCH

S/Ls.—D. A. Beauclair; R. J. Dempsey, D.F.C.; J. Singleton, D.S.O., D.F.C.

F/Ls.—J. A. Cruickshank, V.C.; J. M. Maynard.

F/O.—J. A. Bolton.

SILVER STRINGBAG: A silver model of a Swordfish has been presented to the Navy to commemorate the work of Vice-Admiral Sir Denis Boyd, C.-in-C. British Pacific Fleet, in building up the Fleet Air Arm. Lt. R. H. Reynolds and Lt. Cdr. D. B. Law are seen viewing the model at the Admiralty.

TECHNICAL BRANCH

W/Cs.—W. G. Craddock; S. G. Morgan; J. H. Woffindin, M.B.E.

S/Ls.—W. R. Acott, D.F.C.; S. W. Byrne; G. W. Calvert; J. H. Dellbridge; E. A. Fawcett; W. N. Gibson, B.E.M.; F. G. Hoad; B. J. Hudson; H. W. Hughes, M.B.E.; A. Mackelden; J. E. Potter; F. G. B. Randall; C. H. Robinson; C. K. Street; W. Walster; W. H. Webber.

F/Ls.—J. M. S. Adams; T. H. Bartlett; H. G. Beales; H. E. Bennett; L. Cottingham, D.F.C.; L. M. Courtenay; G. E. C. Goodban; E. N. Jennings; G. V. R. Jones; W. Jopling, B.E.M.; G. E. Langley; J. D. Mallinson, A.F.C.; A. W. A. Messam; R. Nuttall; N. Paxton; B. G. Regan; R. D. Richardson; A. D. Soper; H. A. Steele, A.F.C.; W. Sykes, O.B.E.; C. V. G. Usher; G. B. Weston.

F/Os.—W. Chadwick; R. M. Cooke; J. H. Eaton-Shore; V. E. Mackey; T. Moore; R. M. Munns; H. Old; C. W. Steer, B.E.M.

SECRETARIAL BRANCH

W/Cs.—G. E. Ford; J. C. Gates; E. D. Levien, D.S.O., D.F.C.; P. Louis; E. F. Wain, O.B.E.; W. L. Whitlock, O.B.E.

S/Ls.—R. W. Adams; R. G. C. Browning; J. B. Chinnery, A.F.C.; N. S. Fear; J. D. Ford, O.B.E.; R. J. E. High; R. St. C. Lawrence; N. A. Macfarlane; T. Molloy; H. A. M. Norton; J. Onions, D.F.M.; L. A. Popham; K. Schadtler Law; R. D. Sheardown, O.B.E.; R. C. Skellon; E. B. Townend-Dyson; R. A. P. Turner; G. W. Viggers.

F/Ls.—E. A. Aikman; W. Alexander; J. H. Barnard; R. W. Bass, D.F.C., A.F.M.; J. Cotter, D.F.C.; N. G. Kitchin; E. Knight; M. F. J. Knight; R. M. Martin; A. E. Massey; R. A. Pugh; T. H. Rudd; W. Sowden; J. Steere, A.F.C.; M. K. Webster; A. J. A. Wood.

P/O.—L. W. Fletcher.

EQUIPMENT BRANCH

S/Ls.—V. R. D. Borman; W. L. Cole; H. P. Jones; J. W. Lovell; T. H. Martin; F. E. Shaw.

F/L.—J. R. Stowe.

MEDICAL BRANCH

S/Ls.—W G. Alexander, M.B., Ch.B.; E. C. B. Bramwell, M.B., Ch.B.; D. Crichton, M.B.E., M.B., Ch.B.

DENTAL BRANCH

F/Ls.—G. C. Burton, L.D.S.; E. Jones, L.D.S.; P. L. Padget, L.D.S.; E. M. Poole, L.D.S.; N. W. Valios, L.D.S.

ROYAL AIR FORCE EQUIPMENT

G/C.—J. H. Harris, C.B.E.

W/C.—S. J. Furneaux.

F/Ls.—P. H. Drabble; P. O. Hildreth; J. T. O'Sullivan.

F/O.—R. P. Hogg.

CATERING BRANCH

F/Ls.—P. Bermond; S. G. Maher.

F/O.—J. M. O'Leary, D.F.C.

PROVOST BRANCH

S/Ls.—H. M. Shephard; G. E. Somerfield.

F/L.—A. G. Bullen.

Badge of No. 96 Squadron, R.A.F.—"Nocturni obambulamus" (We prowl by night).

Badge of No. 165 (Ceylon) Squadron, R.A.F.—"Infensa virtuti invidia" (Envy is the fee of honour).

1947

to the
British
Lt. Cdr.

Whitlock,

. Brown-
; N. S.
R. J. E.
A. Mac-
Norton;
Popham;
eardown,
B. Town-
; G. W.

lexander;
D.F.C.,
; N. G.
Knight;
y; R. A.
wden; J.
Webster;

H
L. Cole;
l; T. H.

., Ch.B.;
h.B.; D.
B.

E. Jones,
S.; E. M.
s, L.D.S.
IPMENT

Hildreth;

H
her.

E. Somer-